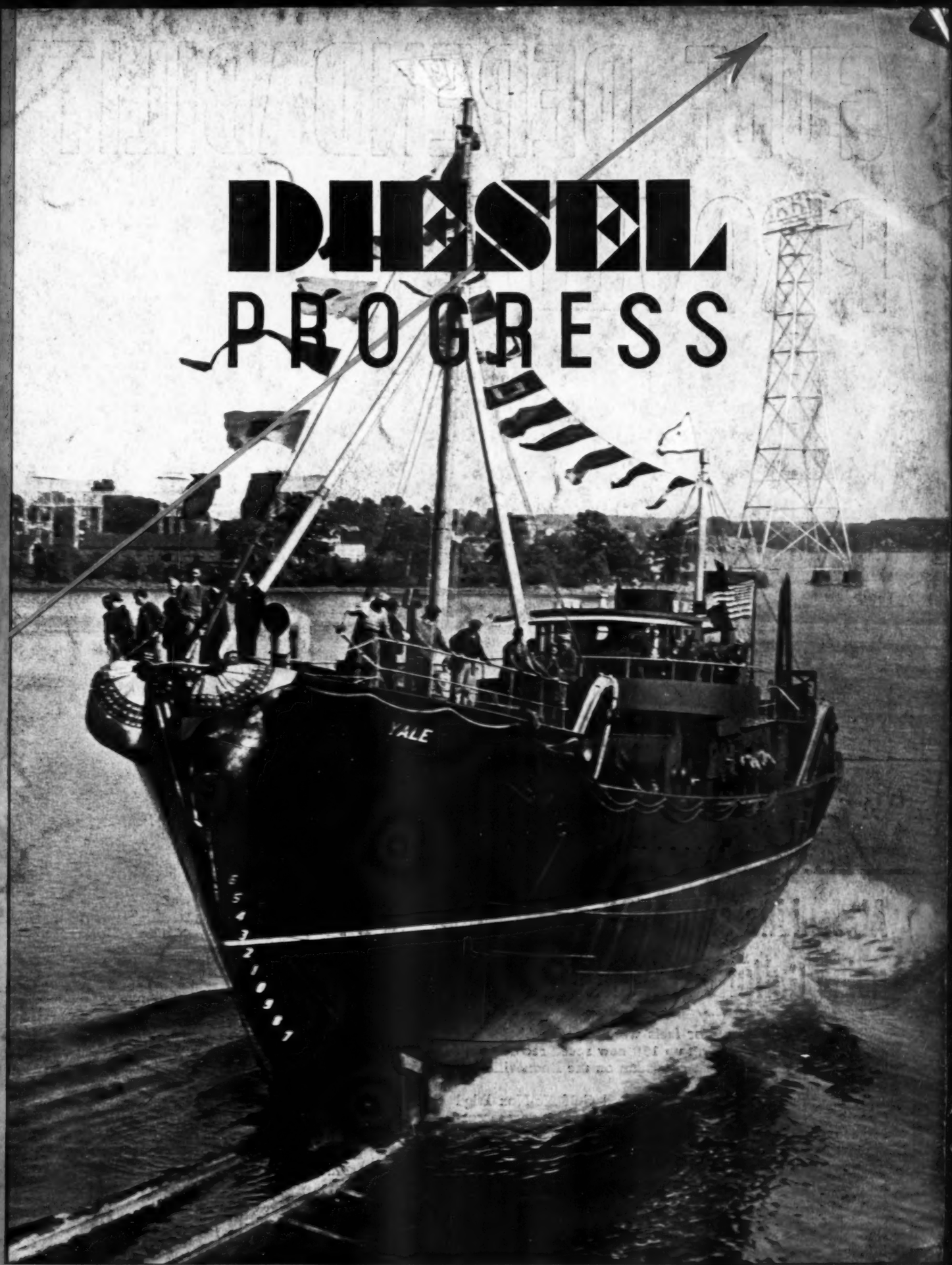
DIESEL PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR



NOVEMBER, 1937 CIRCULATION OF THIS ISSUE—IN EXCESS OF 11,000 COPIES 25c

GULF DEPENDABILITY PROVED! ON UTAH SALT BEDS

87 world and international speed records were smashed by Ab Jenkins in his powerful racing car shown above—raising world's unlimited 24-hour record to average of 157.27 m.p.h. He also broke the 1-hour record at a speed of 177.05 m.p.h.

Car driven by Ab Jenkins photographed while breaking 36 "unlimited" and 36 "Class C" stock closed car records—all well above 100 m.p.h. For 24 hours he averaged 101.72 m.p.h.

Ab Jenkins sets 159 new speed records .... using Gulfpride Oil and No-Nox Ethyl Gasoline

(Supervised and timed by the Contest Board of the American Automobile Association)

NO special lubricants or fuels were used by Ab Jenkins when he recently hung up 159 new speed records with his big racer and his stock car sedan on the Bonneville salt beds in Utah.

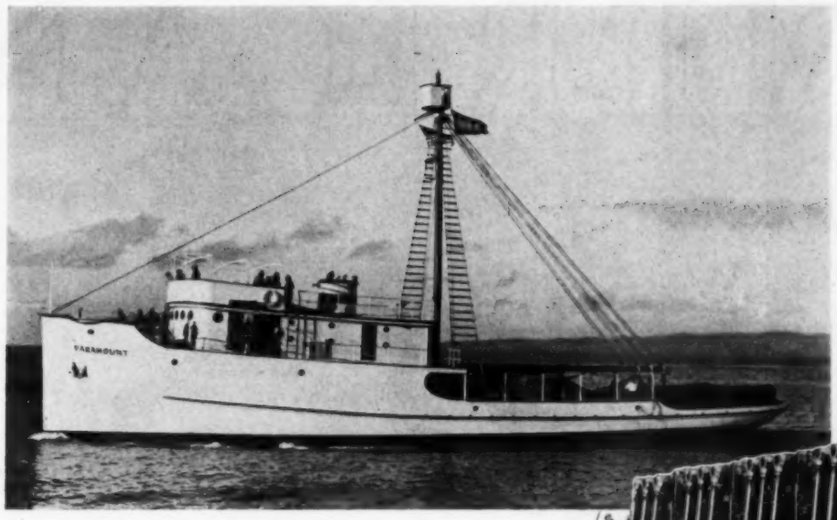
He used the same Gulfpride Oil and Gulf No-Nox Ethyl Gasoline that are giving thousands of car owners new motoring economy and satisfaction every day! *The same gas and oil you can buy for your car from any Gulf dealer!*

Gulfpride Oil has unique qualities which make it an ideal lubricant for all operating conditions. It is refined by a special process — Gulf's exclusive and patented Alchlor process — which removes 20% more waste, carbon, gum and sludge-forming elements. The result is an oil of greater stability, greater resistance to oxidation, better lubricating qualities and longer life.

This same refining process is used in the preparation of Gulf's finest industrial lubricants. Thus, operators of steam turbines, air compressors, Diesel engines and many other types of industrial equipment can secure for their engines and machines the same protection against friction, wear and repair expense that Ab Jenkins received from Gulfpride Oil when he made 159 new speed records in Utah. GULF OIL CORPORATION, GULF REFINING COMPANY, GENERAL OFFICES, PITTSBURGH, PA.

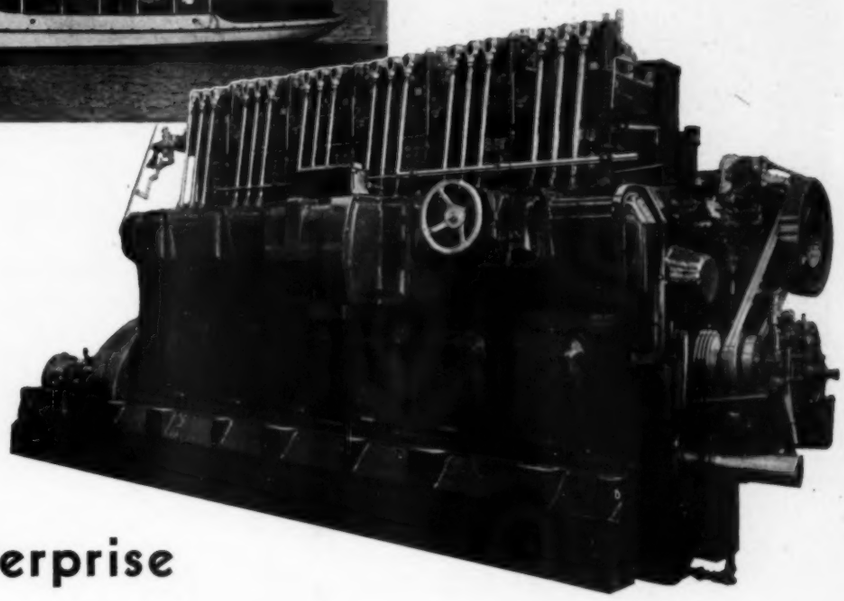
GULF INDUSTRIAL LUBRICATION

DIESEL PROGRESS for November, 1937. Vol. III. No. 11. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 2 West Forty-fifth Street, New York, N. Y. Rex W. Wadman, President. Acceptance under the Act of June 5, 1934, at Brooklyn, New York, authorized May 14, 1935. Subscription rates: United States and Possessions $3.00, Canada and all other countries -5.00 per year. Single copy price 25 cents in U. S. A., 50 cents for all other countries.



Tuna Clipper M. S. PARAMOUNT as she left San Francisco enroute to tropical fishing grounds

600 H. P. DIRECT REVERSIBLE DIESEL



Motorship PARAMOUNT Powered by Enterprise

● The world's largest and most modern purse seiner, the M. S. PARAMOUNT, utilizes Enterprise diesel power throughout, a 600 Hp. direct reversing unit being installed for propulsion and two 85 Hp. diesel-electric generating sets for auxiliary power. This equipment, chosen for its sound engineering features, represents the latest development in heavy duty engines for ocean going service.

● Enterprise engines of both the marine and stationary types have established an enviable reputation for dependability, economy and low cost maintenance. They are furnished in a complete range of sizes up to 1000 horsepower and are available for direct drive, gear drive or electric drive. Each represents the best approved practice in design and construction. Ask for descriptive bulletins.

General Offices:
2904 Nineteenth St.
SAN FRANCISCO

ENTERPRISE
ENGINE COMPANY

Plants Located in
LOS ANGELES and
SAN FRANCISCO

AMERICAN

EUGENIA M. MORAN
and
ELIZABETH W. MORAN

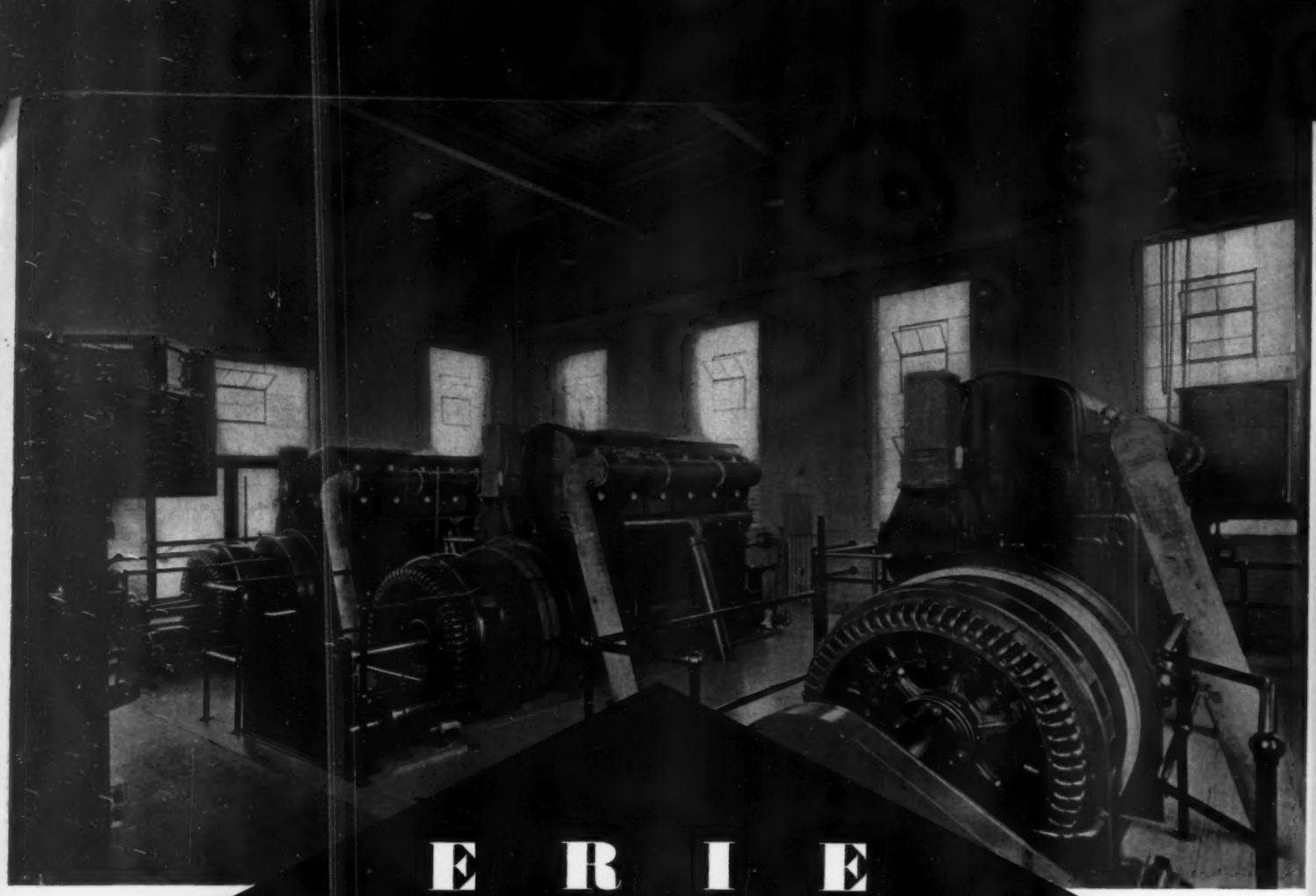
Two ultra-modern sister tug boats built for the Moran Towing & Transportation Co., Inc., each powered by an Alco-Sulzer Model 8-TM direct reversing 2-Cycle Diesel engine, rated 1350 B.H.P.-250 R.P.M.

LOCOMOTIVE COMPANY *Announces*

the placing in service of the first ALCO-SULZER Two-Cycle DIESEL ENGINES

Built according to Sulzer Brothers' (Winterthur) design, their valveless combustion chamber, high mean effective pressure, vibrationless running, and smokeless combustion, constitute the *outstanding 1937 Diesel development* in this country.

Sulzer engines of identical design, in a total of over 80,000 H.P., are in successful operation throughout the world.



E R I E

The three 10½" x 18" six cylinder, four cycle Diesel engines installed by Nordberg Manufacturing Company in the municipal plant at Hominy, Oklahoma, are equipped with Erie crankshafts

Leading engine builders everywhere specify Erie crankshafts and other forged parts when fine quality and accurate finish are necessary.

Complete facilities for prompt delivery on all major forged or cast steel elements required in the building and powering of every type of construction.

ERIE FORGE COMPANY

ERIE, PENNSYLVANIA

An Invitation . . .

to Diesel Owners and Operators who want relief from stuck piston rings, crank case sludge, fuel dilution and other lubricating troubles

These are well known satisfied users of Youngstown Miller oil purifiers:

PARKE, DAVIS & CO.
Detroit, Michigan

INLAND STEEL CO.
Indiana Harbor, Ind.

ILLINOIS CENTRAL RY.
Chicago, Ill.

ERIE RAILROAD
Jersey City shops

ERIE RAILROAD
Briar Hill Shops

U. S. NAVY
Bureau of Aeronautics

CAMPBELL, WYANT & CAMPBELL
(World's Largest Foundry)
Muskegon, Michigan

GRAND HAVEN, MICH.
Municipal Plant

BLOOMINGTON, ILL.
Municipal Plant

ROCHELLE, ILL.
Municipal Plant

SINCE actions speak louder than words and because there have been so many claims regarding purification of lubricating oil, we propose to let the Y-M Oil Purifier prove itself to the Diesel industry by actual savings in operation. We, therefore, offer to furnish a suitable unit to your Diesel plant for you to operate under your own actual working conditions without any obligation to purchase other than your own desire to keep this machine after using it.

We predict that within one week you will notice the following results:

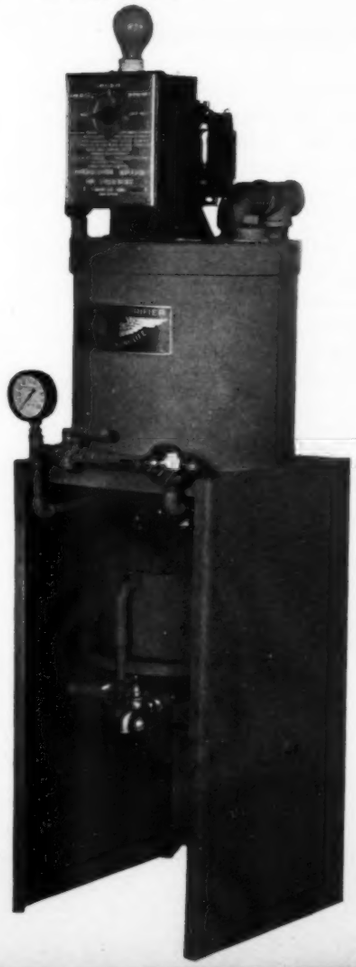
1. Your crankcases will be free from deposits.
2. Your engines will show less tendency to stick piston rings.
3. Less make-up oil will be required.
4. Your engines will operate noticeably better under load conditions due to improved lubrication.

These are not fanciful claims but are matters of record where Youngstown Miller oil purifiers are serving Diesel engine plants.

Remember that this free trial offer is made with the understanding that if you are not perfectly convinced that the Y-M Oil Purifier is a desirable addition to your plant and superior to other units offered for this purpose you are under no obligation to keep it.

If you are interested in a free trial without obligation, fill in the coupon giving number of engines operated and total crankcase capacity.

NOTE: If you prefer, send us two gallons of typical drainage oil taken from your engines for reclamation and we will return samples which will show the degree of purification obtainable by Youngstown Miller purifiers. You may then have a free trial in your own plant to conduct this convincing experiment yourself if you wish.



MODEL H-15
This low priced unit makes the Youngstown Miller process available to the smallest plant and fleet. It performs identically with the large purifiers.

THE YOUNGSTOWN MILLER CO.,
SANDUSKY, OHIO

I am interested in your trial offer without obligation to buy.

Make of engines and lubricating oil gallonage in each .....

.....

.....

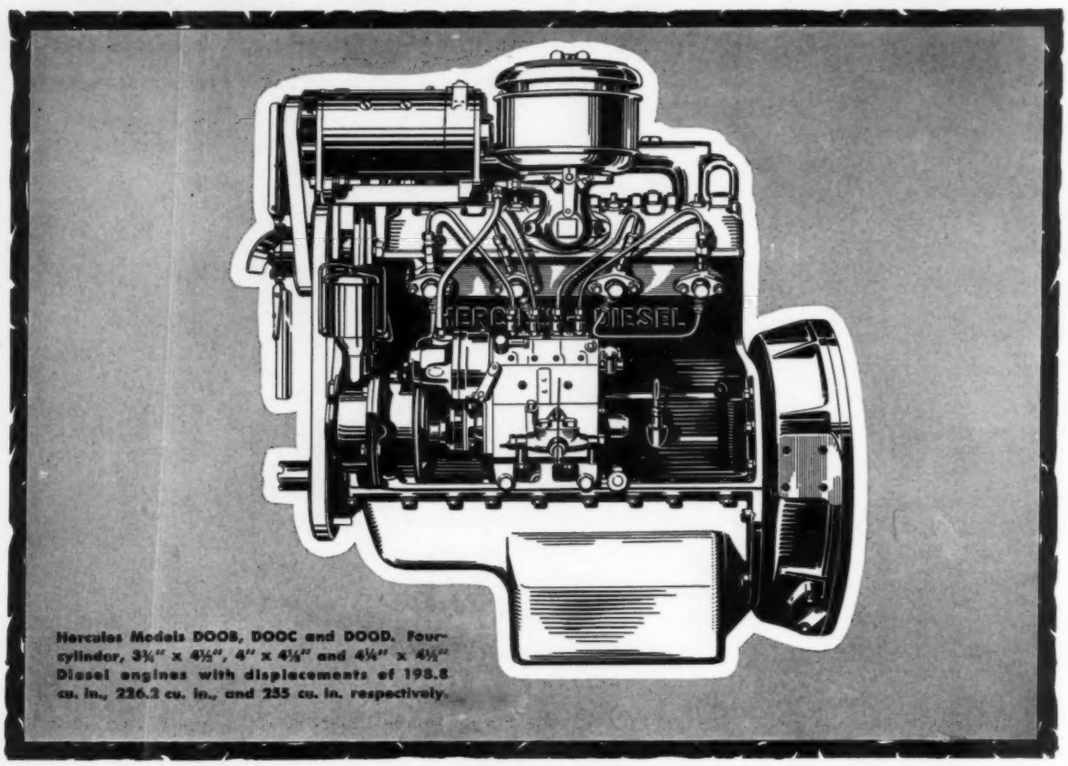
Name .....

Address .....

.....

If you do not use coupon, please mention DIESEL PROGRESS.

HERCULES PRESENTS SMALL 4-CYLINDER DIESELS



Hercules Models DOOB, DOOC and DOOD. Four-cylinder, 3⅛" x 4½", 4" x 4⅛" and 4¼" x 4½" Diesel engines with displacements of 198.8 cu. in., 226.2 cu. in., and 255 cu. in. respectively.

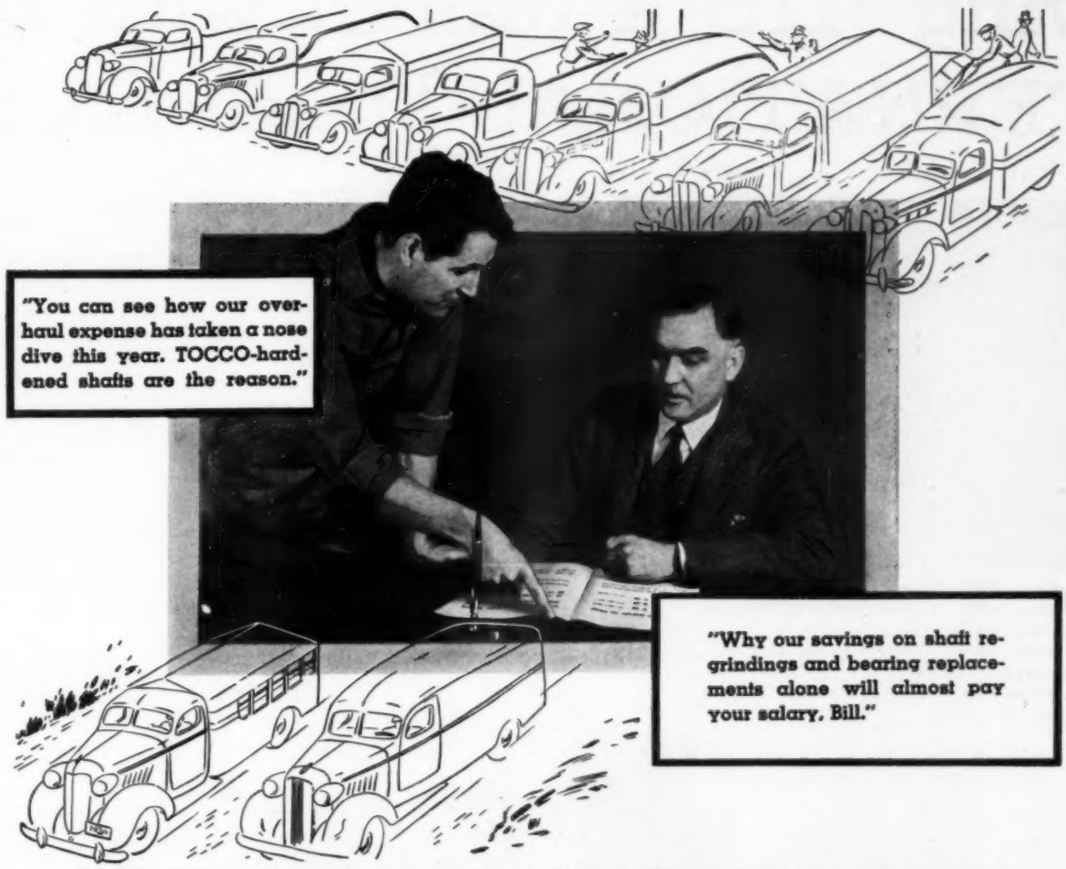
Hercules Motors Corporation now presents to the automotive industry the latest additions to its line of heavy-duty engines—a series of small, 4-cylinder, high-speed Diesels, built in three models, the DOOB and the DOOC, developing 62 h.p. and 70 h.p., respectively, at 2600 rpm, and the DOOD, developing 56.5 h.p. at 1600 rpm. This series of compression-ignition engines brings Diesel economy to new and much broader fields. Like the larger and more powerful Hercules six-cylinder Diesel engines these small Diesels are characterized by a clean, compact design and remarkably complete combustion, which means unusual performance. They are interchangeable in mounting dimensions with the extensively used OO series of Hercules gasoline engines. For more than twenty years Hercules has been building heavy-duty engines exclusively, adding to its line models of advanced engineering design which have kept pace with the varied and changing demands of industry. Again, for 1938, Hercules, world's largest manufacturer of multicylinder, internal-combustion engines only, offers to the automotive industry the widest choice of finely engineered, precision-built power plants—both gasoline and Diesel—for commercial vehicles.

HERCULES MOTORS CORPORATION, CANTON, OHIO

America's Foremost Engine Manufacturer • Power Plants from 4 to 200 H.P.

HERCULES ENGINES

Hercules Engines, both gasoline and Diesel are on display in Spaces C-2 through C-7 at the National Automobile Show, New York City, Oct. 27th to Nov. 3rd; in Space 31 at the Fourth Annual Motor Truck and Accessory Show, Newark, N. J., Nov. 6th to 12th; in Space 36 at the Chicago Automobile Show, Nov. 6th to 13th; and in Spaces 41 through 45 at the A. T. A. Truck and Accessories Show, Louisville, Ky., Nov. 15th to 18th.

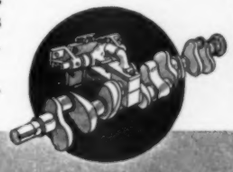


OPERATORS of trucks, buses and every type of heavy-duty equipment are enthusiastic about the way TOCCO-hardened crankshafts save them money by cutting maintenance expense and increasing operating time. The much harder surface which results from TOCCO-hardening makes possible the use of harder bearing metals. Thus, the life of both shafts and bearings is increased many times. Intervals between bearing replacements and shaft regrindings are much longer. TOCCO-hardened shafts maintain original clearances five to ten times as long as do shafts hardened by old-fashioned methods.

European Representative:
Electric Furnace Company • 17 Victoria St.
London, S. W. I., England

Many leading makes of trucks, buses and industrial and agricultural machinery are now powered by engines with crankshafts hardened by the TOCCO Process of surface-hardening by electrical induction. Improved engine performance and the savings to operators in maintenance expense and oil consumption are so pronounced that in response to demand of manufacturers and operators application of the process has rapidly expanded to include hardening of camshafts, spindles, Pitman arm shafts and wearing surfaces of many other parts. Additional information will gladly be sent on request.

Patent rights include full license under all applicable patents of the Ajax Electrothermic Corporation

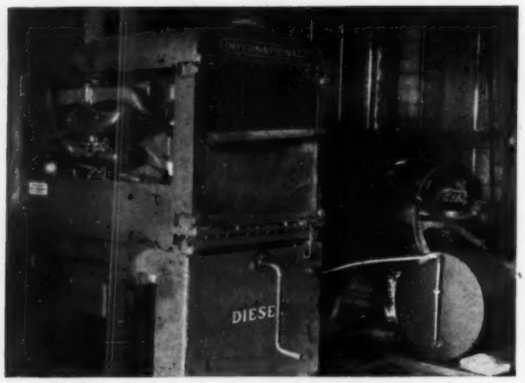


TOCCO PROCESS

SURFACE HARDENING BY ELECTRICAL INDUCTION

THE OHIO CRANKSHAFT CO., *Cleveland, Ohio*

Saving $115 a Month with His INTERNATIONAL Diesel Engine



Above: The International PD-40 Diesel Power Unit and the 30 KW generator supplying power for the Shaffer mine. Fuel consumption averages 25 gallons of 7-7/10 cents-a-gallon fuel a day. Oil is changed every 120 hours of operation.

FOR 22 years John Shaffer operated a coal mine at Brookfield, Mo. Then he installed an International PD-40 Diesel Power Unit and 30 KW generator and *began saving $115 a month!*

The change-over to International Diesel Power followed a demonstration in his mine. That was a year ago. Today he is more sold than ever on International. Outside of the economy of using Diesel fuel, Mr. Shaffer is most pleased with the simple starting of the International Diesel and the quick response of the governor to variations in the load.

"My power requirements are uneven," says Mr. Shaffer. "When the cutter, fan, shaker, and lights are all going, the load is heavy. When the cutter is stopped, the load decreases and the engine immediately throttles down without any fuss. When the cutter is started, it calls for a big increase of power all at once but the International PD-40 takes all those ups and downs in stride. It runs continuously 10 hours a day and I haven't been out a cent for repairs nor lost any time due to breakdowns. I am doing the same amount of work as before but doing it quicker, better, and at least two-thirds cheaper. I feel the International PD-40 *is the best investment I ever made.*"

Right: Scene at the Shaffer mine tipple through which passes an average of 100 tons of coal daily.

Right: The snowy woods and the frozen lakes and rivers of Canada will soon echo to the bark of big International Diesel TracTracTors, hauling supplies to mill and mine, skidding logs in the woods and hauling them out in sleigh trains . . . every day's work a fight with snow and cold. Here is one of the International Diesel-powered sleigh trains owned by R. W. Starratt, Hudson, Ont., in service on Lac Seul.

International Diesel Engine owners everywhere have similar experiences to relate. Find out more about these power units and TracTracTors from the nearby industrial power dealer or Company-owned branch. Write us for catalogs.

INTERNATIONAL HARVESTER COMPANY
(Incorporated)
180 NO. MICHIGAN AVE. CHICAGO, ILLINOIS

INTERNATIONAL Industrial Power

THEY CALL IT THE "TREMENDOUS TRIFLE"

Oil—relatively a small purchase...But 110 Industries find in this "tremendous trifle" the way to lower manufacturing costs... Backed up by Socony-Vacuum "Correct Lubrication"

Correct Lubrication
Means the Right Oil...
in the Right Way
...in the Right Place

A DROP OF OIL! Select the right kind ... deliver it in the right way ... to the right place ... and it may save you thousands of dollars a year!

The amount of oil and grease you buy annually may be *less than ½ of 1% of your total purchases.*

BUT THIS *TREMENDOUS TRIFLE* CAN PROFOUNDLY AFFECT EFFICIENCY AND PROFIT.

It can increase output. Lower maintenance costs. Protect capital invested in production units.

And the slight difference in price between the cheapest oil and Gargoyle Lubricants... is often multiplied a thousand times by these benefits of CORRECT LUBRICATION.

SOCONY-VACUUM

CORRECT LUBRICATION

GARGOYLE Lubricants

SAVES MONEY FOR INDUSTRY

STANDARD OIL OF NEW YORK DIVISION · WHITE STAR DIVISION · LUBRITE DIVISION · WHITE EAGLE DIVISION
WADHAMS OIL COMPANY · MAGNOLIA PETROLEUM COMPANY · GENERAL PETROLEUM CORPORATION OF CALIFORNIA

IMPERIAL IRRIGATION DISTRICT

(BRAWLEY, CALIFORNIA)

Texaco Lubricants serve to keep pumps, piping, and oil lines free from sludge and gum; assure uninterrupted flow to cylinders and bearings.

Cylinders and crankcases of these three 1125 b. p. Hamilton M. A. N. Engines have been lubricated exclusively by the Texaco Ursa Oil Series ever since going into service.

DIESEL PLANT *Gets perfect start!*

THE ENGINEERS of this ultra-modern Diesel plant gave plenty of attention to its lubrication, studied other plants, consulted designers and engine builders. As a result, they decided on the Ursa Oil Series.

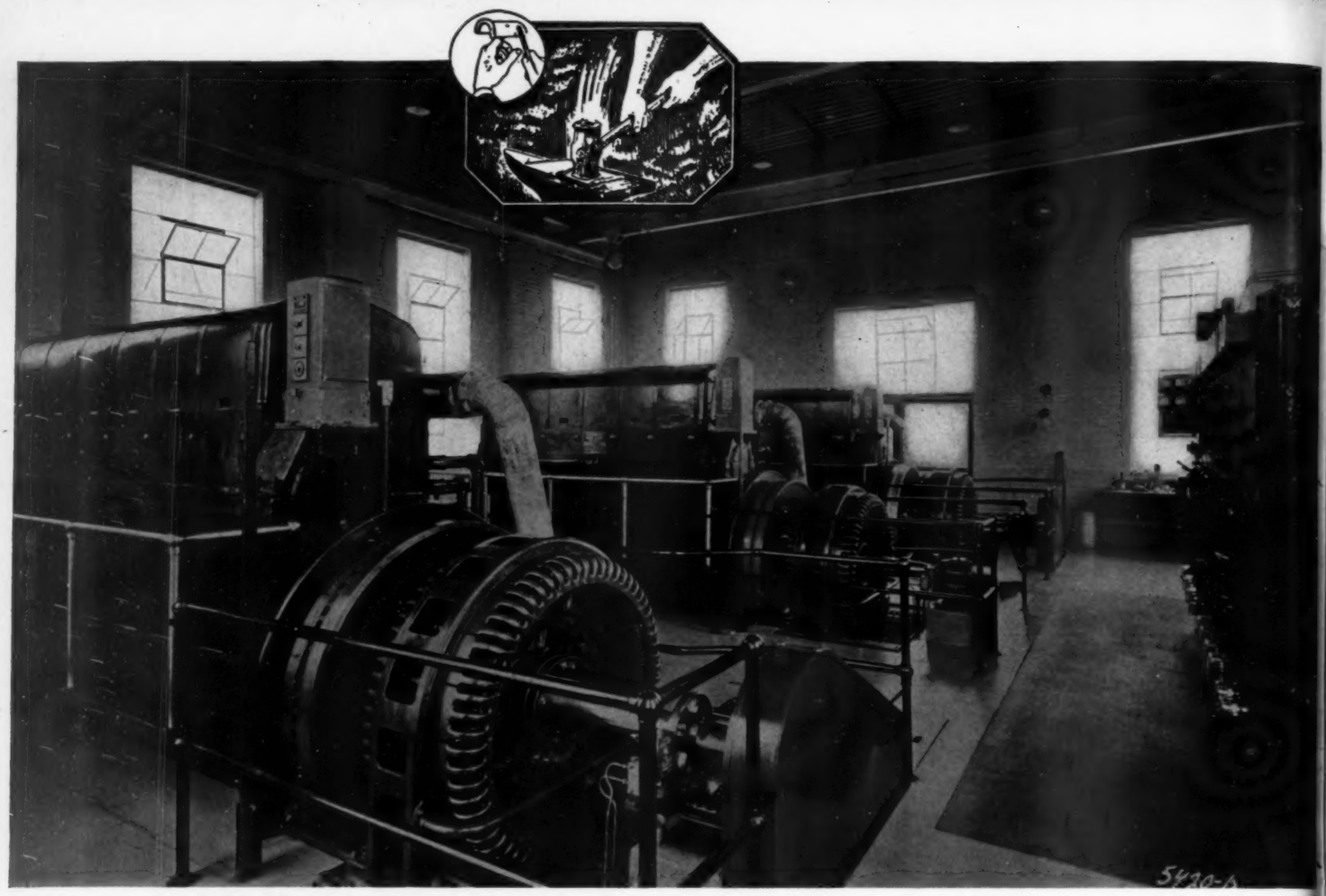
Experience has proved the soundness of this choice. Compression is excellent. The engines are surprisingly clean, efficient. The performance of the Ursa Series at plants like this is one more reason why *more Diesel h.p. in the United States is lubricated by Texaco than by any other brand.*

Texaco Ursa Oils are in a class by themselves because they keep piston rings free and active in their grooves for longer periods of operation.

Trained lubrication engineers are available for consultation on the selection and application of Texaco Diesel Lubricants. Prompt deliveries assured through 2070 warehouse plants throughout the United States. The Texas Company, 135 East 42nd Street, New York City.

TEXACO

TEXACO *URSA OILS*
For all types of DIESELS



Diesel installation in the Hominy, Oklahoma, municipal power plant. Three Nordberg engines are used, 10½ x 18", six-cylinder, four-cycle, rated at 300 hp. at 400 rpm. These Diesels are connected to three Elliott generators, three-phase, 60-cycle, 2400 volt, rated 200 kw. at 80% power factor. The engines are equipped with Satco lined bearings.

"Round and round she goes . . . and when she'll stop nobody knows!"

THE wheels of industry are the wheels of fortune . . . but they need not be wheels of chance. Power — to enable the factory, shop and office to do business as usual; to furnish illumination for a critical surgical operation; to light the lamps for a leisurely bridge game — must keep pulsating through the mains. Its sure, steady flow cannot be left to chance. Diesel power is dependable power but it depends on good bearings for much of its dependability. And because reliable bearings are all-important, Satco* metal has virtually become standard equipment in Diesels everywhere. Satco gives predictable performance. Satco has proved its dependability under all operating conditions. Heavy loads, high speeds, compression stresses, lubrication lapses — Satco takes them all in stride. Satco, in short, is designed to meet today's power production problems. Diesel operators say, "*Satco for satisfaction.*"

**A patented alloy manufactured by National Lead Company. Trade-mark registered.*

AMERICAN BEARING CORPORATION

AFFILIATED WITH NATIONAL LEAD COMPANY

INDIANAPOLIS — CENTRIFUGAL American Bearings FORCE — INDIANA

For safe OVERLOAD lubrication..and 10 TIMES MORE DIESEL SERVICE HOURS

SINCLAIR TEN-OL

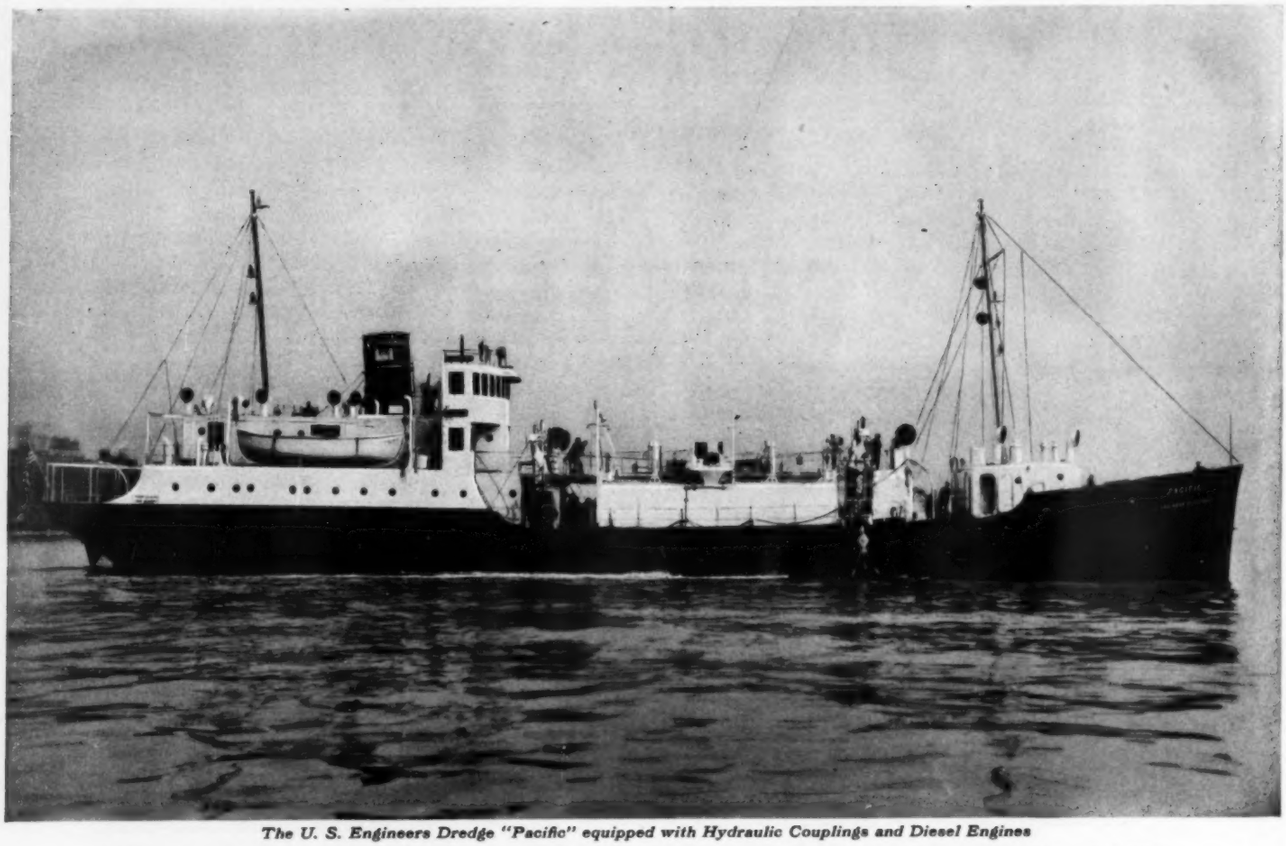
REG. U. S. PAT. OFF.

Highway emergencies...landslides... snowslides...often force long overload service on "Caterpillar" Diesel auto patrols. Lubrication with Sinclair Ten-ol is the sure way to obtain full protection for rings and liners, and sustained delivery of highest engine output under the toughest operating conditions. There is a special grade Ten-ol—20 W—for winter service.

Ten-ol is a new fused lubricant developed by Sinclair for all types of "Caterpillar" Diesels. It gives continuous top performance at lowest operating costs, and ten times more Diesel service hours than the finest straight mineral oil.

Order Sinclair Ten-ol, Sinclair Diesel fuel, and other Sinclair products from your local Sinclair office, or write Sinclair Refining Company (Inc.), 630 Fifth Ave., New York, N. Y.

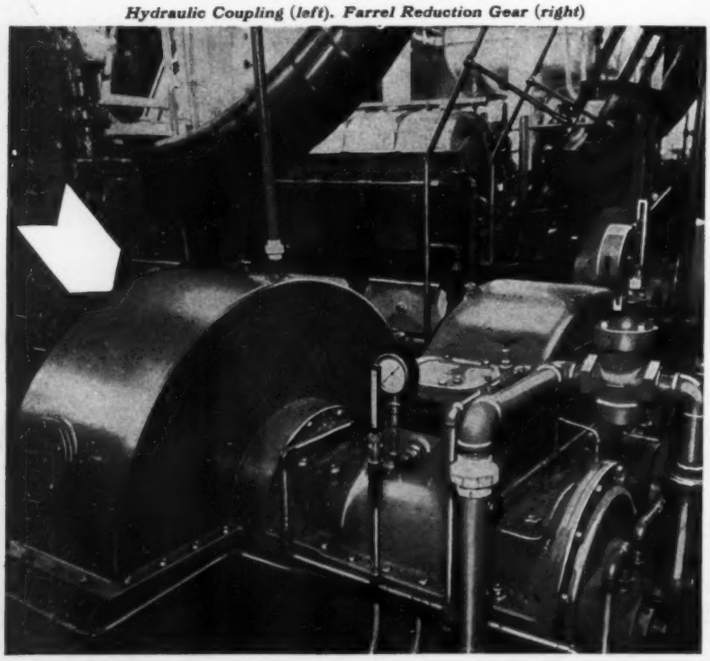
Sinclair TEN-OL is recommended as a "new outstanding Diesel engine lubricant" by Caterpillar Tractor Co.



The U. S. Engineers Dredge "Pacific" equipped with Hydraulic Couplings and Diesel Engines

HYDRAULIC COUPLINGS PROTECT ENGINES AND GEARS AGAINST SHOCKS AND VIBRATIONS

Hydraulic Coupling (left). Farrel Reduction Gear (right)



Vulcan Hydraulic Couplings—the modern Diesel drive—were selected for use with the Winton Diesel propulsion engines and Farrel reduction gears in the modern U. S. Engineers Dredge "Pacific". In the hydraulic coupling there is no mechanical connection between driving and driven members, and power is transmitted solely by the automatic circulation of oil between radial passages formed in the two rotating elements. The fluid connection insures against the transmission of shocks and vibrations and permits the engine to deliver power to the gears and propeller shaft with turbine smoothness. Other features of the hydraulic coupling include high efficiency (97% at full speed and power), a minimum of wearing parts, and the ability to provide speed regulation, where this feature is required. When used with multiple engine drive it provides smooth and rapid clutching and declutching and an effective equalization of speed and load. Thoroughly proved in scores of European installations—including the largest Diesel plants afloat—the hydraulic coupling is now available in the United States for marine propulsion and dredge pump drives, as well as for numerous industrial and traction applications. Our Engineers will gladly cooperate with you without obligation or charge.

HYDRAULIC COUPLING DIVISION

AMERICAN BLOWER CORPORATION

Fisher Building, Detroit, Michigan • 50 West 40th St., New York, N. Y.
Washington, D. C. • San Francisco, Cal.

YES IT'S PROVED!

READ WHAT THEY SAY ABOUT THIS PATENTED DISCOVERY—
"RPM" DIESEL ENGINE LUBRICATING OIL

MARYLAND
"We can say nothing but the best for 'RPM' Diesel Engine Lubricating Oil."

"Fourteen months ago I began using 'RPM' Diesel Engine Lubricating Oil... most of my problems were eliminated... Have just completed a six mile project involving 1,000,000 cu. yds. of dirt... Used eight RD-8 and 75 'Caterpillar' Diesel Tractors and am convinced that your product has increased their life and reduced service costs."

(Signed) D. B. HILL
General Contractor
Little Rock, Ark.

ALASKA
"The finest oil that I have ever used in a 'Caterpillar' Engine."

NEVADA
"The most satisfactory oil obtainable for performance and economy. We operated 10,000 hours and didn't lose a minute nor spend one penny on upkeep.... Conditions extremely dusty."

NEW BRUNSWICK
"Experience so satisfactory we now purchase 'RPM' Diesel Engine Lubricating Oil in carload lots."

CALIFORNIA
"Been running night and day for 2,464 hours on 'RPM' Diesel Engine Lubricating Oil—performing 100%."

ARKANSAS
"We know from experience this oil returns considerable savings in servicing costs as well as longer engine life"

IDAHO
"This oil has proved everything claimed for it."

IDAHO
"Am operating 60 hours between drains and the oil is as good as when first put in—also oil pressure is the same at all times."

NORTH CAROLINA
"Never have to add oil between changes. This never happened before 'RPM' Diesel Engine Lubricating Oil was used."

LOOK FOR THIS TRADE MARK

RPM
REG. U.S. PAT. OFF.
DIESEL ENGINE LUBRICATING OIL

DISTRIBUTED IN THE UNITED STATES BY:

THE CALIFORNIA COMPANY (Montana only)
THE CARTER OIL COMPANY, Tulsa, Oklahoma
COLONIAL BEACON OIL COMPANY, INC.
HUMBLE OIL & REFINING COMPANY
STANDARD OIL COMPANY (Indiana)
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—IN CANADA BY:

IMPERIAL OIL LIMITED
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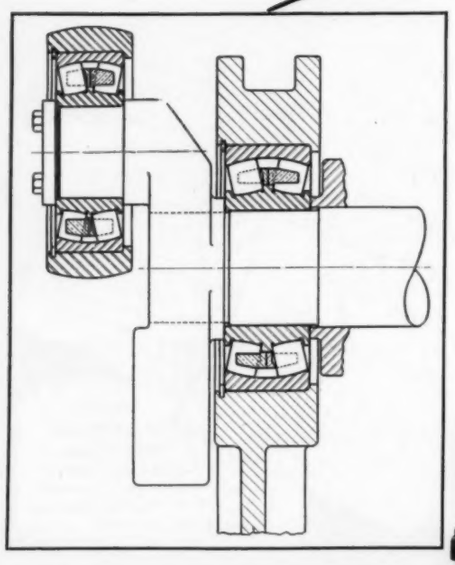
—and by distributors in more than 100 other countries

STANDARD OIL COMPANY OF CALIFORNIA

Recommended by
CATERPILLAR TRACTOR CO.

Crankpins and Crankshafts

need SKF's



CONTINUOUS PERFORMANCE—that's what makes SKF self-aligning, self-contained spherical roller bearings the RIGHT BEARINGS for crankpin and main crankshaft locations on this Gumbo Buster Engine.

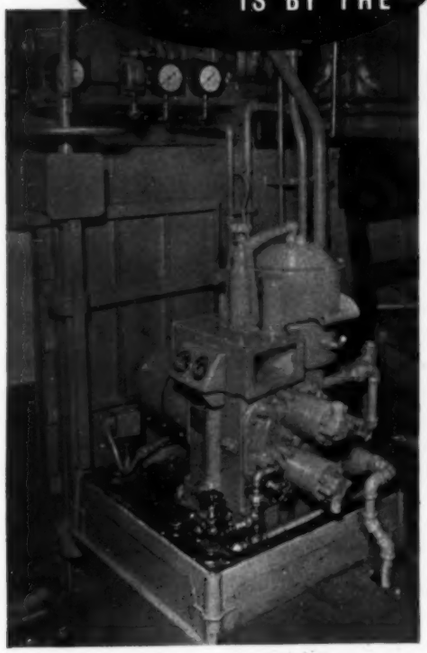
Self-aligning, they permit inherent but slight inaccuracies and deflections without affecting their capacity. *Self-contained,* they make possible the simple construction of component parts. They are built to *perform!* If you want the right bearing in the right place, let SKF solve your bearing problems. SKF Industries, Inc., Front Street & Erie Avenue, Philadelphia, Pa. 3957

SKF
BEARINGS

American Well and Prospecting Co., 12" bore, 12" stroke Gumbo Buster Engine

ON
U. S. ARMY ENGINEER'S
DREDGE "PACIFIC"
LUBRICATION INSURANCE
IS BY THE—

DE LAVAL "UNI-MATIC" OIL PURIFIER



Designed for practically continuous, heavy-duty operation, the new U. S. Army Engineers' Dredge "Pacific" has been assured of clean lubricating oil for her five Diesel engines by means of a De Laval "Uni-Matic" Oil Purifier. This machine will constantly remove impurities from the oil and so provide more efficient, more dependable lubrication at lower cost—as similar De Laval Purifiers have done on other Army Engineers' dredges for many years.

Outstanding power plants of all types—whether land or marine, steam or Diesel—almost invariably include De Laval Oil Purifiers among their auxiliary equipment. Low repair and maintenance costs are almost impossible of achievement except with efficient lubrication—and no oil can lubricate properly unless it is clean.

De Laval Oil Purifiers are selected because of their well-known ability to more completely remove carbon, sludge and water from the lubricating system and so keep the oil in the cleanest and most efficient condition possible.

Why not ask for further details in Bulletin No. 112.

De Laval Oil Purifiers are available as individual purification units, or as complete, compact plants such as the De Laval "Uni-Matic" which includes pumps, gauges, heaters, etc. Units are direct motor driven, self-lubricated and ball bearing equipped. Bowls or purifiying members, may be of self-draining type for easy cleaning and are scientifically rated as to efficiency to give Guaranteed Performance.

THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 427 Randolph St., Chicago
DE LAVAL PACIFIC COMPANY, 61 Beale St., San Francisco
THE DE LAVAL COMPANY, LTD.
Montreal Peterboro Winnipeg Vancouver

DE LAVAL OIL PURIFIERS

. . . about Diesel engines and Aluminum pistons

High speed or slow, one hundred horsepower or ten thousand — your Diesel engine can and should have the advantages of Lynite pistons of Alcoa Alloys. The properties which make Aluminum excellently suited for Diesel piston use are these:

Light weight is of special importance for pistons running at high speed. Reciprocating weight is greatly reduced, bearing pressures are less. When pistons are Aluminum, bearings last longer.

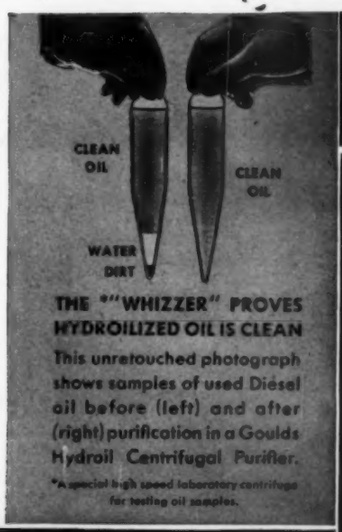
The superior heat conducting property of Aluminum increases the dependability of large Diesel engine pistons and is an added advantage in smaller pistons. The intense temperatures encountered in combustion chambers are distributed more evenly throughout the piston crown. Danger of piston failure, because of thermal stresses, is minimized.

When you specify Lynite pistons of Alcoa Aluminum Alloys, you are assured of the uniform dependability of scientifically controlled manufacture. ALUMINUM COMPANY OF AMERICA, 2141 Gulf Building, Pittsburgh, Pennsylvania.

Be sure . . . THEY ARE

LYNITE PISTONS

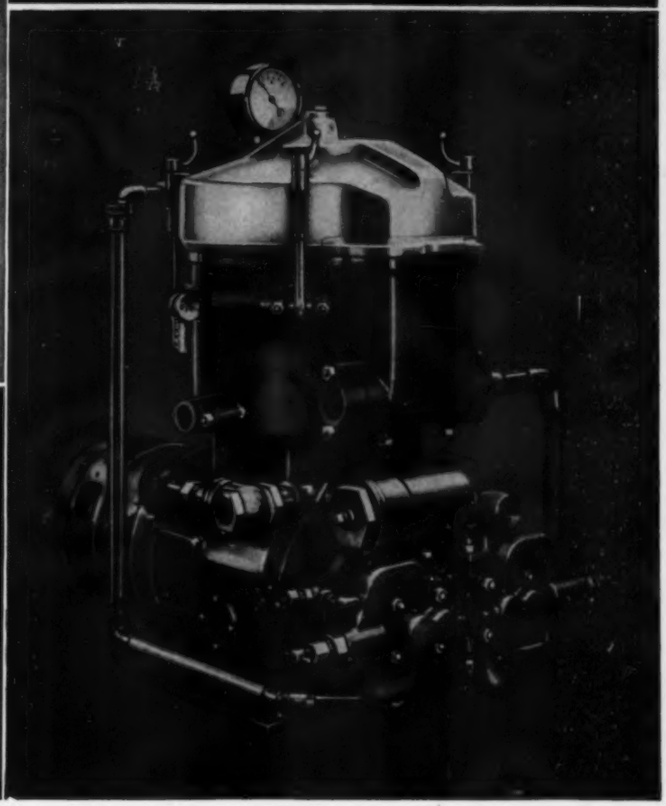
CAST OF ALCOA ALUMINUM



THE *"WHIZZER" PROVES HYDROILIZED OIL IS CLEAN

This unretouched photograph shows samples of used Diesel oil before (left) and after (right) purification in a Goulds Hydroil Centrifugal Purifier.

*A special high speed laboratory centrifuge for testing oil samples.



GOULDS HYDROIL CENTRIFUGAL *Oil Purifier*

Saves in Operating and Maintenance Costs

Diesel Engine operators know of the savings a Goulds Hydroil Centrifugal Oil Purifier effects through reducing operating and maintenance costs.

Fuel and lubricating oils, even when subject to more than usual contamination in service, can be kept clean and pure at all times. Even special oils require frequent purification if their original lubricating value is to be maintained.

PROLONG ENGINE LIFE: In The Goulds Hydroil, high speed rotation builds up a centrifugal force that throws out dirt, water, sludge, carbon deposits and other abrasive matter assuring a free flow of clean fresh oil to all moving parts. Clean oil prolongs engine life.

1. PROLONG ENGINE LIFE
2. REDUCE OIL CONSUMPTION
3. LOWER MAINTENANCE COSTS
4. GET THE DETAILS

REDUCE OIL CONSUMPTION: The removal of water and sludge from lubricating oils by centrifuging makes frequent costly oil changes unnecessary. Oil can be used over and over without damage to bearings or plugging of oil lines.

LOWER MAINTENANCE COSTS: Clean fuel and lubricating oils, from a Goulds Hydroil Centrifugal Oil Purifier, reduce such maintenance costs as lines wear, re-boring and replacement, bearing wear, etc., and result in more savings because of fewer shutdowns for repairs.

GET THE DETAILS: Write for complete data on Goulds Hydroil Centrifugal Oil Purifier.

GOULDS PUMPS Inc.

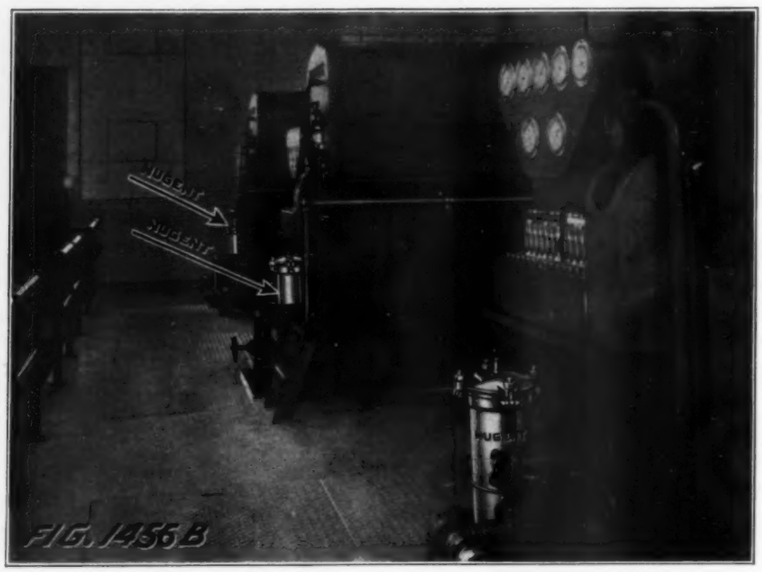
SENECA FALLS N.Y.

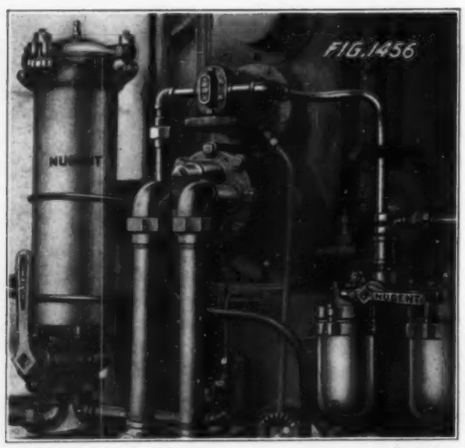
ATLANTA, BOSTON, CHICAGO, HOUSTON, NEW YORK, PHILADELPHIA, PITTSBURGH, TULSA, Representatives in all Principal Cities

7333

NUGENT FUEL & LUBE Oil Filters

Protect All Three Nordberg Diesel Engines at Hominy, Okla.





A "close-up" view showing one of the Nugent Duplex Fuel and Lube Oil Filters.

"I LIKE THEM FINE"

Wm. W. Nugent & Co.
410-412 Hermitage Avenue,
Chicago, Illinois

October 5, 1937

Dear Sirs:

I am answering your letter of Sept. 29th in regard to the Nugent Oil Filters.

We have three Nordberg Diesel Engines three hundred H.P. full Diesel solid injection, equipped with both fuel and lubricating oil filters of your make.

I like them fine. They are doing a splendid job of cleaning. It is very essential that the fuel be very clean on account of the solid injection and as for the lub. oil filter, we have good clean oil going over our bearings at all times, which will prolong the life of the bearings and will pay for the Filters in a short period of time.

We have been operating the plant almost four months, and our lub. oil is just as clean as when we started. The color, just a little darker, is all the difference. I am glad to furnish you with any information at any time.

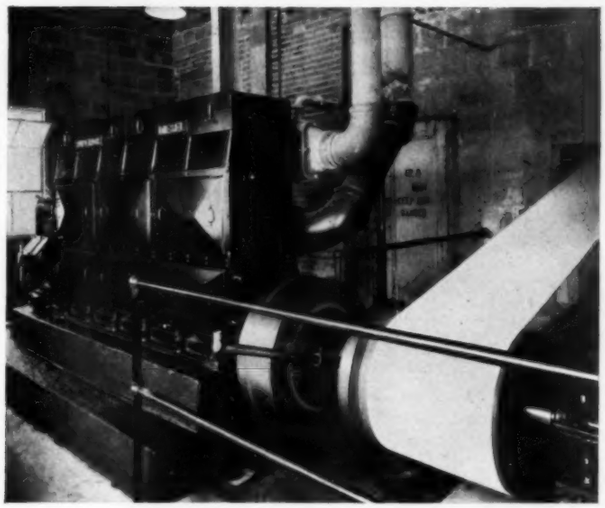
Very truly yours,
(Signed) H. E. WAFFLE, *Chief Engineer*,
Hominy Light & Power Plant.

THEY HAVE 20 TIMES MORE FILTERING AREA THAN MOST FILTERS (PATENTED).

Wm. W. Nugent & Co., Inc. Mfrs.
Oil Filters, Oiling and Filtering Systems, Telescopic Oilers, Oiling Devices,
Sight Feed Valves, Flow Indicators, Compression Union Fittings, Oil Pumps, Etc.
415 N. Hermitage Ave. Established 1897 Chicago, U. S. A.

Economical, dependable power for brick and tile manufacturing plants

260 horsepower Superior Diesel assures economical power supply for Montrose Clay Products Company, Montrose, N. Y.



A huskier youngster replaced a veteran of 10 years when the new 6-cylinder Superior Diesel replaced the old 120 horsepower Otto-Superior Diesel in this plant.

The new engine like the old, is the only source of power. It drives the lineshaft system and a triplex pump supplying all the water for the plant.

Variable speed of the engine regulates production. The engine cannot be overloaded because the auger press die will be forced off before the overload point is reached.

As it may be profitable to replace or supplement other prime movers in many plants with Superior Diesels, so may it be profitable to replace an old or overloaded Diesel with a larger, more modern Superior Diesel.

Let us suggest the most practical application of engines in your plant— this or any other industry.

THE NATIONAL SUPPLY COMPANY

SUPERIOR ENGINE DIVISION, SPRINGFIELD, OHIO

LOS ANGELES, CALIFORNIA — PHILADELPHIA, PA.

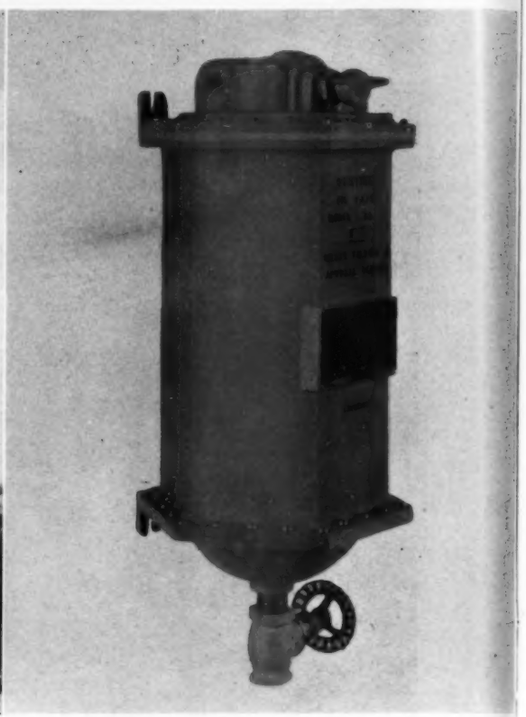
Superior DIESELS

HEAVY DUTY MODELS: 50 to 810 H.P., 250 to 720 R.P.M. • HIGH SPEED MODELS: 15 to 150 H.P., 900 to 1800 R.P.M.

· DIESEL FILTERS ·

Nine Repeat Orders from the Famous Poling Fleet

"Poling Brothers No. 14," one of eight vessels owned by Chester A. Poling, Inc., equipped with Sentinel filters on both fuel and lubricating oil lines.



Sentinel Oil Filter Model No. 500. Two such units have been purchased for the Poling fleet in addition to eight other Sentinel filters of various sizes.

After using his first Sentinel for approximately a year, Robert L. Poling, Vice-President of Chester A. Poling, Inc., Petroleum Transportation, wrote the following letter which speaks for itself:

Mr. O. Smith Johannsen, Distributor,
Sentinel Oil Filters,
50 Church Street, New York, N. Y.

Dear Sir:—

In reply to your inquiry about the Sentinel oil filters installed by us some time ago, we are pleased to state that the results obtained have been entirely satisfactory in every respect.

The fuel oil filter makes it possible to operate the engines for a much longer time without cleaning the fuel valves and it greatly reduces wear on the fuel pumps.

The lubricating oil filter keeps the oil free of grit, dirt, and carbon and as a result, the lubricating oil consumption has been reduced to such an extent that the saving of oil alone will pay for the filter within a short time.

We are pleased to recommend the Sentinel to any owner of Diesel engines who appreciates the value of a simple, efficient and reliable oil purifier.

Very truly yours,

Signed: Robert L. Poling, V. P.

Since March 5th, 1932, Poling Brothers have given the Diesel Filter Company nine repeat orders. Needless to say, the first filter installed is still rendering satisfactory service.

•

Sentinel Oil Filters eliminate 100% of all water and solids to 1/10,000 of an inch and have a high efficiency to 1/50,000 of an inch. They are therefore more than just oil strainers.

When you want the best in oil filters, you will install a Sentinel. Why not write today to your nearest representative of Sentinel Oil Filters. He will be glad to furnish you with specific information on proper filters for your engine.

DEALERS

O. Smith Johannsen
50 Church Street,
New York, N. Y.

Hathaway Machinery Co.
New Bedford, Mass.

Calmes Engineering Co.
215 Carondelet Bldg.
New Orleans, La.

Intermountain Diesel Sales Corp.
65 West 4th, South,
Salt Lake City, Utah.

William A. Furtwangler
4 Broad St.
Charleston, S.C.

DIESEL FILTER CO.
(INCORPORATED)

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Western Sales Co.
200 Davis Street
San Francisco, Calif.

Burrard Iron Works Ltd.
231-235 Alexander St.
Vancouver, B.C.

L. C. Badouin
La Paz, Baja Calif.
Mexico.

Another DeLaVergne Diesel Protected by an "Alnor" Exhaust Pyrometer

FORREST CITY, Arkansas, which has gradually enlarged their municipal Diesel plant since 1921, installed this year a 1000 hp. De LaVergne Diesel.

This latest unit is equipped with modern accessories to insure its safe and most economical operation including an Alnor Exhaust Pyrometer. As will be seen from the view above, the Alnor Pyrometer is mounted conveniently on the side of the engine, enabling the operators to keep a close check on the conditions of each cylinder, thus guarding against maladjustments and assuring the most efficient service.

In Alnor Pyrometers is found the latest in engineering design backed by more than 37 years' experience in instrument manufacture. Alnor does not offer just one size and style, but a wide variety, designed and built for the size Diesel and the size of the plant and the service for which it is used.

"Alnor," Model RB, Exhaust Pyrometer similar to the one recently installed on the new 1000 hp. De LaVergne Diesel at Forrest City, Arkansas.

Write for Complete Catalog

ILLINOIS TESTING LABORATORIES, Inc.

423 North LaSalle Street • Chicago, Illinois

Testing Engineers and Manufacturers of "Alnor" and "Price" Measuring Instruments. Products of 37 Years' Experience.

"Alnor" Pyrometers

NO. 3 OF A SERIES

Is this man worth 10 minutes of your time?

FOR two years he has planned to secure a ten-minute interview with you. He has invested $1,000, more or less, in himself—a result of saving and sacrifice. He gave up a job; stopped earning money; dedicated his entire time to justify a request for ten minutes of your time.

Many successful men in the Diesel and Gas Engine Industries have won their laurels in the "practical school of hard knocks." They fought their way to the top by sheer grit and determination. You, as one of the successful Diesel men, are now at or near the top. Our young man pictured on this page is another "You"—the "You" of five, ten or twenty years ago. He, too, has the same "stuff" in him, the same pioneering spirit that you recognize in the man who has made good.

Two years ago he became determined to enter the Diesel Industry. He knew he was mechanically inclined, but lacked knowledge and experience. He knew he must be prepared if he was to "make the grade."

What did he do? Instead of looking for a job for which he was not then qualified and without imposing a burden on the busy Diesel Industry, he took steps to prepare himself. He saved and sacrificed until he had sufficient funds. Then he sought a group of experienced, practical Diesel men to work for him, to guide him and to teach him what he lacked. He put these men to work six hours a day for nearly a year. To him it was like getting a successful Diesel man such as yourself, to pass on to him all of the knowledge gained in the climb to success in the Diesel Industry. At the same time he worked on all types of Diesel Engines and equipment under the watchful eyes of those who were paid to train him. *Yes, he went to a Diesel trade school* but he paid his own way at absolutely no cost to the Diesel Industry.

Isn't this young man worth something to you? He wants a chance, an opportunity to start just as you started years ago. He is not yet a *finished* product but he has the fundamental technical knowledge and the real incentive of making a valuable employee to you who seek loyalty and initiative in the man you hire.

We think this man is worth ten minutes of your time. He is entitled to a chance in the Diesel Industry.

•

In your need for such a man we are pleased to make available his services with our fullest recommendation. National Schools is endeavoring to place with the Diesel Industry young men who have been carefully trained by the most practical methods. National Schools was established in Los Angeles in 1905 and has continued without interruption under the management of its founders, with a definite policy of honesty, sincerity and worthiness of purpose. Today, National Schools, representing a million-dollar investment, offer sound, thorough instruction courses in Diesel and Gas Engine work and Radio and Electricity.

NATIONAL SCHOOLS

4000 South Figueroa Street • Los Angeles, California

[PIONEERS OF PRACTICAL TRAINING FOR 32 YEARS]

REX W. WADMAN
Editor and Publisher

FRONT COVER ILLUSTRATION – One of three Diesel trawlers launched this month at the Fore River yard of the Bethlehem Shipbuilding Corporation, Quincy, Mass., for General Sea Foods. Each of these three modern vessels is powered by a 650-hp. 6 cylinder Cooper-Bessemer Diesel engine. A completely illustrated editorial description of these vessels will appear in an early issue of DIESEL PROGRESS. A description of the Cooper-Bessemer Type "LT" engines, as installed in the three trawlers, appears in this issue on page 49.

TABLE OF CONTENTS ILLUSTRATION – A fleet of seven Bucyrus-Erie draglines powered by Caterpillar Diesels recently delivered to Rio de Janeiro for the purpose of digging drainage canals to reclaim swamp land outside the city for suburban home sites.

DIESEL PROGRESS for November, 1937, Vol. III, No. 11. Published monthly by Diesel Engines, Inc., 2 West 45th St., New York, N. Y. Tel, MUrray Hill 2-5092. Subscription rates: U. S. A. and Possessions $3.00 per year; 25c per copy. All other countries, $5.00 per year; 50c per copy.

NOVEMBER CONTENTS

This 1350 hp. Diesel tug has a cruising range of 3750 miles at 7 knots towing and over 6000 miles running free.

DIESEL TUG, "EUGENIA M. MORAN"

By JOHN W. ANDERSON

TWO notable additions are being currently made to the Moran tugboat fleet in the shape of the *Eugenia M. Moran* and the *Elizabeth W. Moran*. They are sister ships, and the first has already gone into active service. The second is expected to follow during the current month. Built at Beaumont, Texas for the Moran Towing and Transportation Co. they embody some advanced tugboat design ideas and they are the first to have the new Alco-Sulzer marine Diesel engines.

These are powerful tugs, designed for ocean towing, and are to be used ordinarily in coastwise, canal and Great Lakes towing. The illustrations show the general appearance of the boats, and also engine room and the engine itself. In the exterior view, note the navigating bridge just aft of the pilot house. In good weather, and especially in canal and harbor work, this permits the Captain and helmsman to navigate and control the tug movements from this vantage point, having a view all around. Duplicate steering and engine telegraph stands are provided on this bridge, in the pilot house and near the stern. Masts are arranged to be lowered, and then these tugs can slide comfortably under the 15 ft. 6 in. clearance of the canal bridges. If necessary in this connection, the trim of the boat can be altered by using the ballast tanks, and another innovation has been introduced here by using the fuel tanks as ballast tanks. There is an after fuel tank, a double bottom tank, and a cross bunker. In addition there is a forepeak ballast tank.

Considerable attention has been given to the working conditions and living comfort of the crew. For instance, during bad weather all interior parts of the tug can be reached without going out on deck. Hot and cold running water are provided by motor driven pump pressure systems. And a York hot water heating boiler keeps the quarters warm in cold weather.

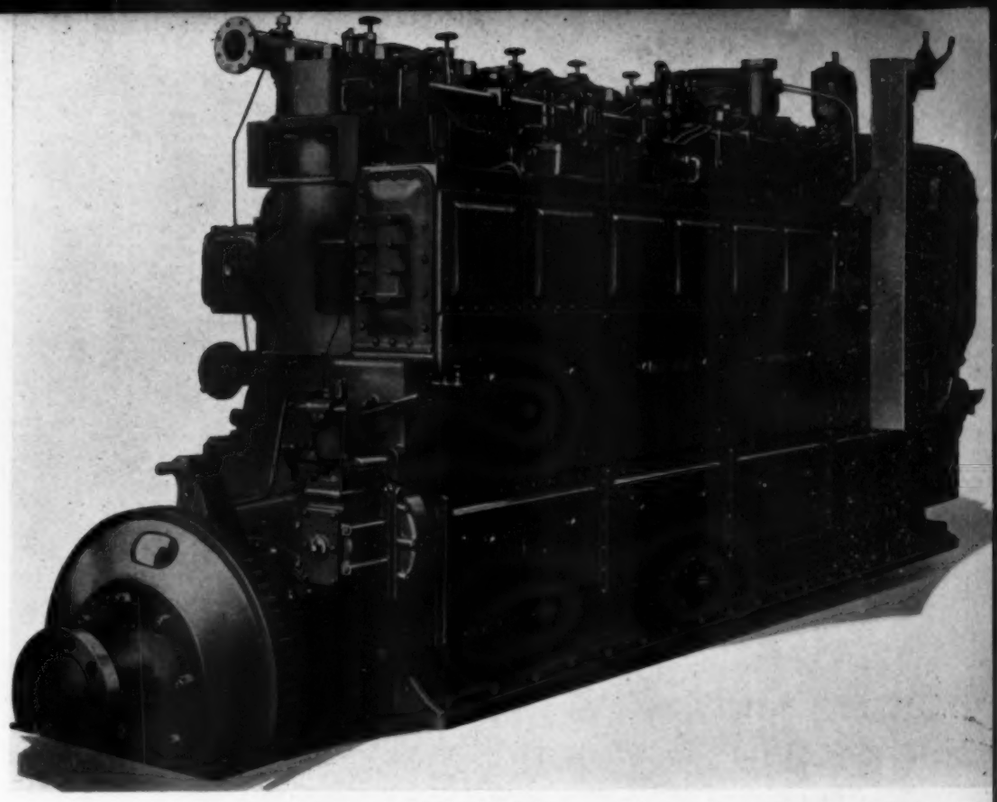
It is interesting to observe that this eight cylinder two cycle Alco-Sulzer single screw Diesel engine installation rated at 1350 bhp. at 250 rpm. is floated in a hull 94 ft. 6 in. long by 25 ft. beam and 12 ft. molded depth. The engine turns a 7 ft. 6 in. diameter propeller. The engine room views gives some idea of the machinery layout, but in addition there are some additional items to be mentioned. The main engine has all of the necessary pumps attached, and at the after end there is a chain driven generator for supplying electrical requirements. The latter include lights, searchlight, electric-hydraulic stearing gear, motor driven ship's pumps, and motor driven capstan for handling towing lines. A secondary source of electric power is a 30 hp. Superior Diesel engine driving a 20 kw. generator. And there is also an Edison storage battery that floats on the line when the main engine driven generator is running, and is a source of power when both engines are shut down. The tug's whistle or sound signal is operated by compressed air obtained from the Diesel engine starting system through a reducing valve.

The engineer's station is on the upper grating at the forward end of the engine as shown in the view of the upper part of the engine room. The gaugeboard is on the bulkhead nearby. For maneuvering the main engine there are only the two levers shown. One of them controls the quantity of fuel supplied to the cylinders, and hence the speed of the engine; the other controls the starting, stopping and reversing. They are interlocked so that no false maneuvers can be made. This maneuvering gear is notable for its simplicity and the promptness of the engine response, and is one of the features of the engine. The air starting valves in the cylinder heads are pneumatically operated from a control box attached to the scavenging air trunk. The fuel injection pumps are of the type where the quantity of fuel is controlled by the seating of the suction valves. The adjustable fuel pump cams are so located that the end of the stroke is nearly at top crank center. Thus it is unnecessary to reverse the motion of the injection pumps. Scavenging and exhaust events are controlled by the piston motion regardless of the direction of rotation of the crankshaft. Hence to reverse the motion of the engine, it is only necessary to control the starting valves so as to start the engine rolling in the new direction.

The well known Sulzer system of scavenging the cylinders is employed. This provides ample and efficient scavenging after the exhaustports have been uncovered at the end of the working stroke. And since the scavenging ports are slightly higher than the exhaust ports, the completion of the scavenging process is followed by a slight supercharging process, that provides a full charge of air in the cylinders. Scavenging air is supplied by the simplest sort of reciprocating pump driven from the forward end of the engine crankshaft. Suction is through a muffler above the pump, and the discharge is into the trunk running along the sides of the cylinders. The flow through the scavenging ports is through automatic valves which prevent the backflow of exhaust gases.

The exhaust header along the back of the engine collects the exhaust from all cylinders and sends it up through the muffler in the stack above the engine room.

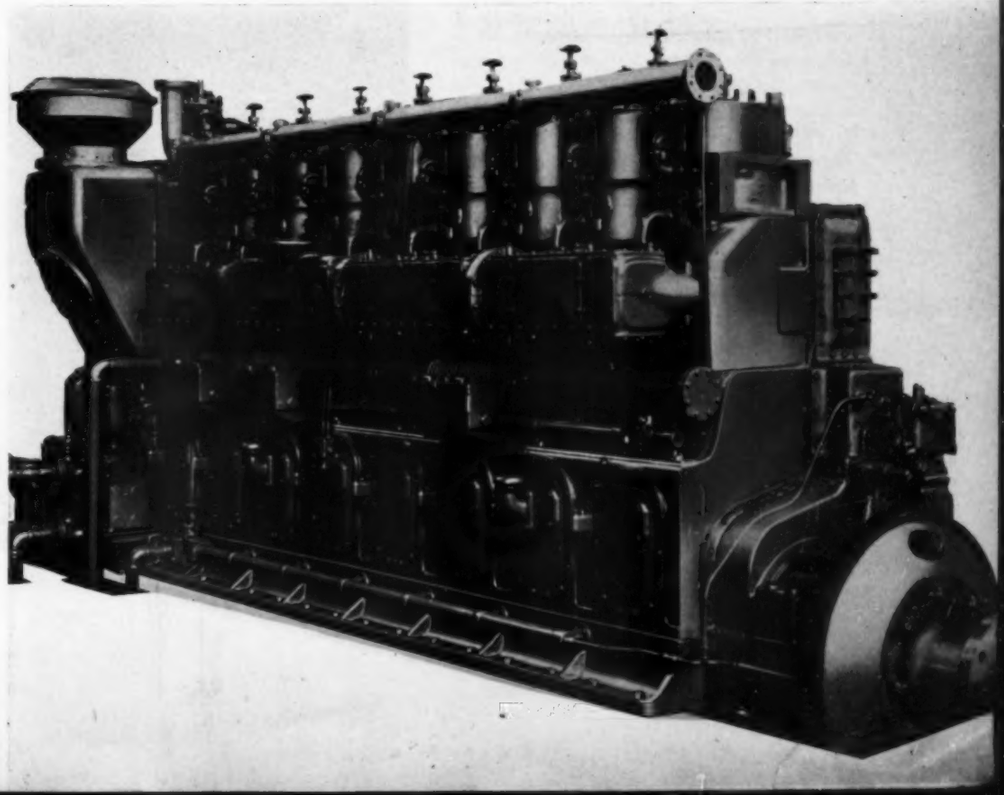
The engine structure consists of two main castings – the bedplate and the cylinder block or frame. The bedplate bolts to the foundation and carries the main crankshaft bearings. The lower part of the bedplate acts as the lubricating oil sump. The frame casting includes the upper part of the crankcase and acts as a water jacket box into which the working cylinder liners are inserted from the top. The bedplate and frame bolted together form a very rigid girder for maintaining the alignment of the engine bearings and cylinders.

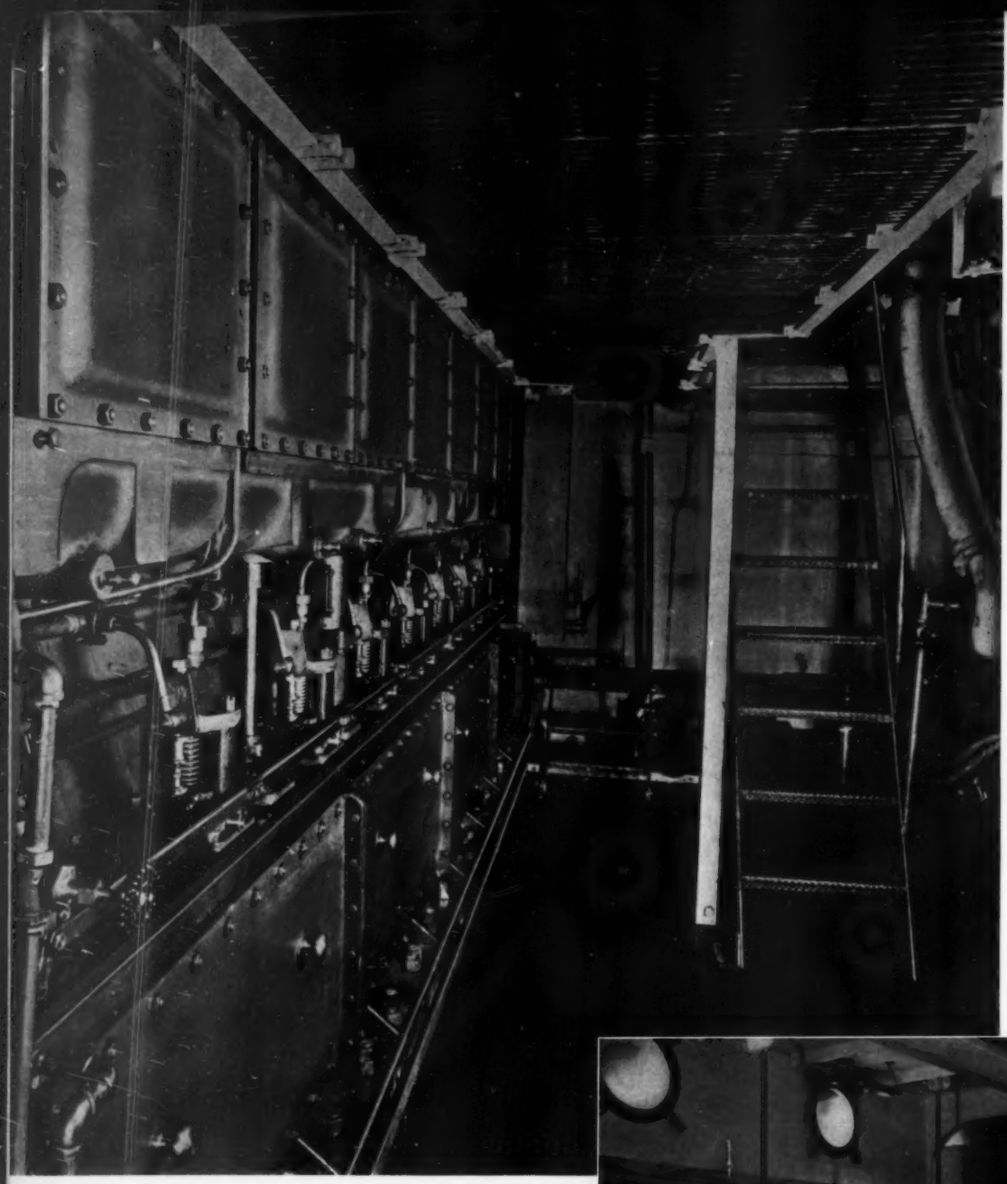


Operating side of the first Alco-Sulzer, two cycle Diesel engine. The controls extend through the upper engine room grating.

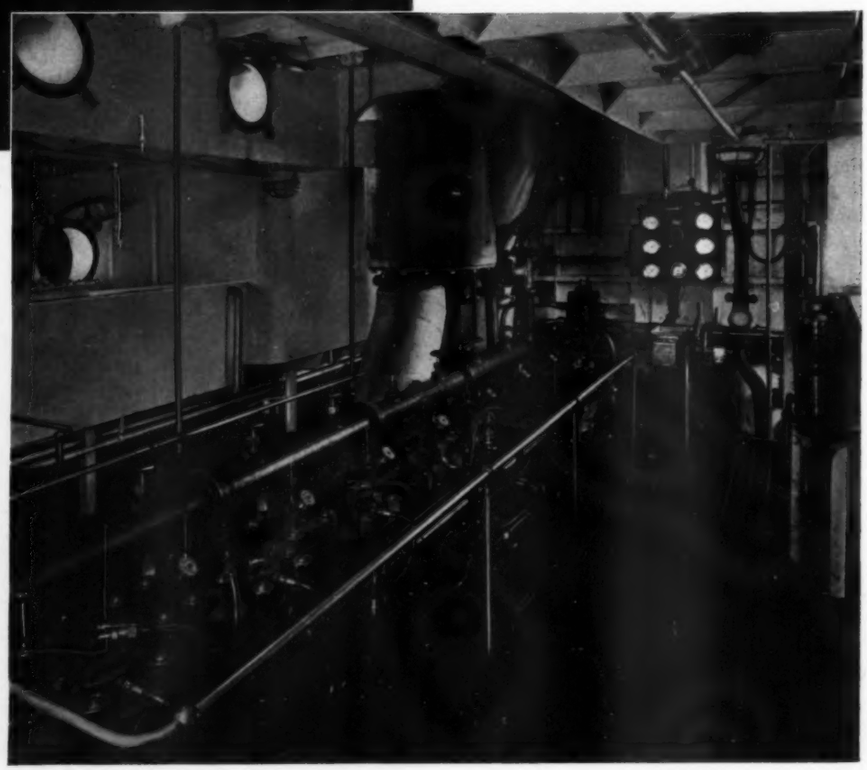
The cylinder liners are of special hard cast iron, are held in place by the cylinder heads, and are free to expand at the lower ends in the gas and water-tight joints. Cylinder heads are bolted to the top of the cylinder block and are of simple cast iron construction. In them there is only the center opening for the fuel injection valve and an opening for the air starting valve. Cooling water is carried from the cylinder jackets (in the frame) by outside connections into the cylinder heads, and inside of the head jacket spaces the water is directed by jets towards the central portion of the head

Exhaust manifold side of the new Alco-Sulzer unit installed in the "Eugenia M. Moran."





Views of the lower and upper engine room aboard the new 1350 hp. Moran Diesel tug. Controls and instrument panel appear at lower right.



including the injection valve opening wall. These heads are removed by breaking the piping connections and loosening the nuts on the holding down studs.

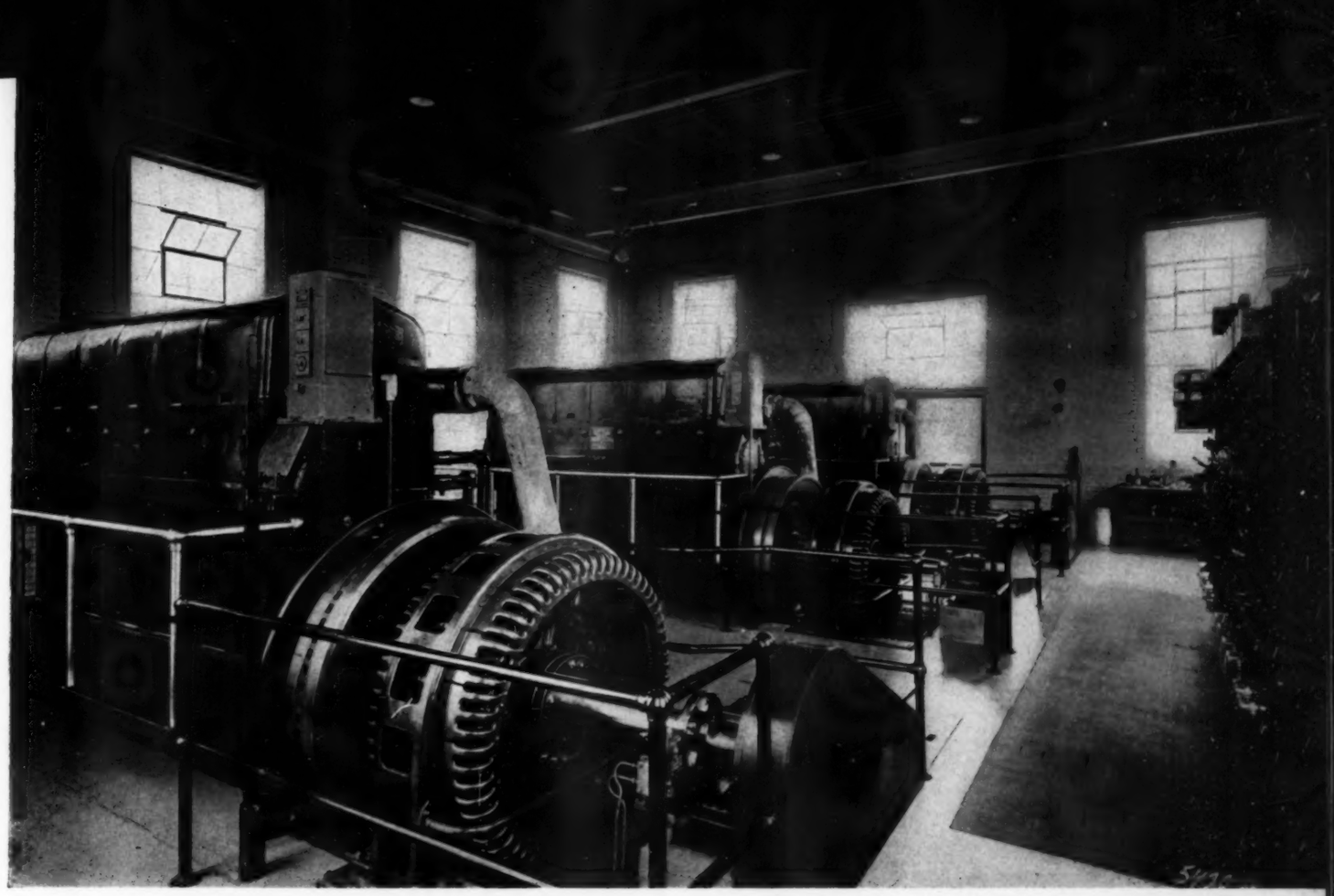
Trunk pistons are used, oil cooled, and with perfectly flat tops to present a minimum of area to the heat of combustion. Cooling oil is carried to and from the pistons by telescopic pipes.

The crankshaft is made from a single piece steel forging. Built-in at the after end of the engine are the engine turning gear and the single collar propeller thrust bearing. The camshaft runs along the front of the engine inside of the crankcase, and is driven from the crankshaft at the flywheel (after) end by gearing. This camshaft carries the cams for the individual fuel injection pumps.

Opposite each cylinder there is one of these pumps, so that the length of the high pressure tubing between the pump and the multihole hydraulic pressure operated injection valve in the cylinder head is the same for all cylinders. These pumps can be seen along the engine in the view of the lower engine room. A mechanical type overspeed governor is fitted.

The lubricating oil and cooling water pumps are located at the forward end of the engine. The cooling water pump is arranged so that even though there may be water leakage from it, none of this leakage can possibly get into the engine lubricating system. The lubricating system includes a filter and a cooler. This system includes both the piston cooling and the bearing lubrication circuits. Special attention nas been given to accessibility of all parts, and to this end very large crankcase doors and many handhole covers are fitted on the engine.

During the trials and on the trip up the coast, the engine behavior has been all that was expected. The performance of these tugs in every day service is going to be watched with more than usual interest.



HOMINY, OKLAHOMA

By V. V. LONG, *Consulting Engineer*

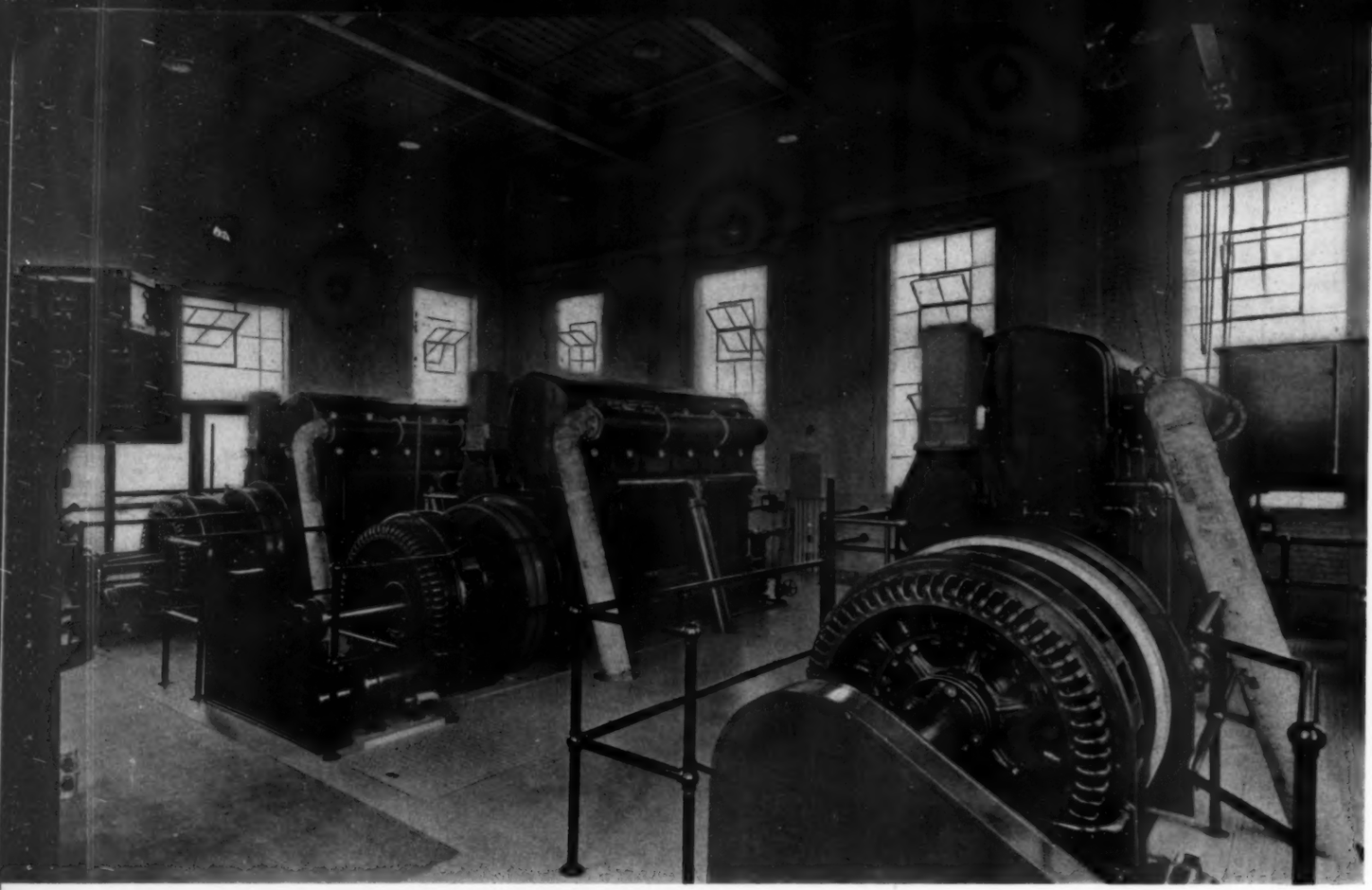
HOMINY, with a population of 4,500, is located in the south central part of Osage County, the largest county in the State of Oklahoma, with an average width of 60 miles and extending from the Kansas line on the north to the Arkansas River on the south and comprises what was originally set aside by the United States Government as a reservation for the Osage Tribe of Indians. First laid out as a Townsite in 1905, Hominy soon became a thriving trade center for the vast livestock and agricultural interests adjacent to the city. In 1912 oil was discovered under the Osage Indian lands and Hominy became the center of an active oil producing and storage industry.

The municipal light and power plant, which was placed in operation June 20, 1937, is interesting in that the City of Hominy, through its elected officials, has successfully prosecuted a seven-year battle of litigation against injunctions in district, state and federal courts.

In 1930, electric service in Hominy was being rendered by the Oklahoma Utility Company under a franchise which expired March 12, 1934. The city owned and operated its own water system and the profits therefrom aided materially in paying the costs of the municipal government. Investigation disclosed that the gross electric revenues of the Oklahoma Utility Company, as reported to the State Corporation commission, had amounted to $62,388.33 from the sale of 789,915 kwh., with a peak load of 310 kw., for the year of 1929.

The city council decided that a municipal light plant should be given consideration, as a source of revenue and profit for the city, inasmuch as the utility franchise would expire in four years. Therefore, engineers were employed to make a report as to the cost and feasibility of an electric plant. The engineers recommended a $150,000.00 bond issue for financing the plant. Before proceeding further Mayor W. R. Brady invited some fifty business men to confer and advise with the city council in the consideration of the engineers' report covering both original and operating costs of the proposed plant and this body of men made the decision that Hominy should have a municipal plant and pledged their support and efforts to do whatever was needed to push the cause along.

After seven years of litigation the power plant construction was started on July 15, 1936. The power plant equipment, housed in an attractive building of matfaced brick construction, consists of three Nordberg Diesel engine generating units, each unit consisting of a 10½" x 18" six cylinder, 4 cycle Diesel engine with 300 bhp. rating at 400 rpm. Each of these are direct connected to a three phase 60 cycle, 2,400 volt Elliott-Ridgway generator rated 200 kw. at 80 per cent P.F. Excitation is furnished by a direct current 7½ kw. Elliott-Ridgway generator driven by a Texrope from the main crankshaft.



The three 6 cylinder, 4 cycle, 300 hp. Nordberg Diesels driving Elliott generators as seen from the switchboard.

On official tests over an eight-hour period on each unit the following fuel consumption data, under various load conditions, were obtained:

Full Load		10% Over Load		½ Load		¾ Load	
Wt. Lbs. Bhp.	*Cost Pr. Kwh.*	*Wt. Lbs. Bhp.*	*Cost Pr. Kwh.*	*Wt. Lbs. Bhp.*	*Cost Pr. Kwh.*	*Wt. Lbs. Bhp.*	*Cost Pr. Kwh.*
.4115	.00263	.4170	.00256	.4415	.00277	.4080	.00235

Owing to the contract with the utility company mentioned earlier in this article whereby the city purchased current from the company until June 20, 1937, the plant was operated only over the period necessary for making the official tests. Fuel oil used is 29.5 gravity. Heat content 19,200 btu. per pound and is delivered to the plant at a cost of .0353 per gallon. There are two 10,000 gallon underground fuel oil storage tanks outside the plant building and a 300 gallon service tank inside. The fuel oil is pumped through a Goulds Hydroil from the storage tanks to the service tank from which it is metered to each engine. Auxiliary equipment, consisting of circulating pumps for engine cooling and spray water, were furnished by the Allis Chalmers Manufacturing Co., and are direct connected 3 phase 220 volt, 60 cycle A.C. motors with three closed circuit units from hot well through cooling coils to storage tower and back through engine, 1 unit with 225 gpm. capacity with 5 hp. motor, 1 unit with capacity of 150 gpm. with 3 hp. motor and 2 units with 75 gpm. capacity with 2 hp. motor. Also, there are three open circuit pump units taking water from base of cooling tower through sprays. One unit is of 300 gpm. capacity with 5 hp. motor, one of 200 gpm. capacity with 3 hp. motor and one of 100 gpm. capacity with 2 hp. motor.

This arrangement provides flexibility in the cooling system so that the correct amount of water can be circulated as required by the load condition prevailing at different periods of the day. The engine cooling system consists of a 15,000 gallon elevated tank. Reasonably soft water is available. All drain water from the plant roof is piped to the hot well and no trouble from scale formations is expected. The amount of make-up water required will be very small. The cooling tower installed is of the Marley type.

The switchboard was furnished by the Allis Chalmers Manufacturing Co. and consists of three generator panels, 1 regulator panel, 2 double circuit distribution panels, 1 double circuit street lighting panel and 1 swinging bracket on which are mounted 2 voltmeters, sychronscope and power factor motor. Square type indicating wattmeters and ammeters are mounted on each panel. On the regulator panel is mounted the Brown Bomeri voltage regulator and a Westinghouse 200 kw. Graphic Watt Meter and Static Ground Detector; disconnects are provided on the rear of each panel so it can be disconnected from the main bus bars.

The City of Hominy has at present about 975 consumer customers, the number having increased by about 100 since the city took over the distribution system on June 20, 1936. The average load is 135 kw. with a low of 100 kw. and a peak load on Saturday nights of 320 kw. Their week day peak load is 220 kw. Rural lines operated by the city at present consist of approximately 15 miles of line serving the adjacent territory to the north, south, east and west, with the service of about 10 miles more of rural lines contemplated for the near future.

View along the alley behind the Diesels. Note the Nugent lubricating oil filter installed on each unit. Two Goulds Hydroils appear against the far wall.

The rate being charged domestic consumers by the city at present is the same as that fixed by ordinance at the time they took over operations of the system in June, 1936. That is 8½c per kwh. for current with a substantial reduction, 5½c per kwh., for current used in excess of 12kwh. per room per month.

The principal contractor on the Hominy Power Plant and Distribution System has been the White Way Corporation of Milwaukee, Wisconsin, who built the distribution system and handled the electrical installations at the power plant. The Nordberg Manufacturing Company of Milwaukee, Wisconsin, furnished the Diesel engines and power plant equipment. The power plant building was constructed by A. Sugarman Company of Des Moines, Iowa.

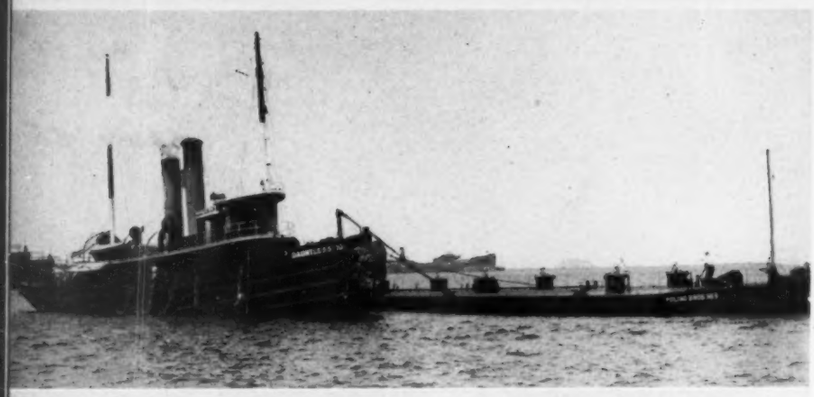
The engineers for the city were the V. V. Long & Co. of Oklahoma City, who furnished plans and specifications and were represented on the site by Mr. R. J. Bates and R. W. Calloway as inspectors. The Public Works Administration was represented by C. A. Marcus, Assistant Resident Engineer Inspector.

The operation of the plant and distribution system is in the direct charge of Mr. W. R. Brady as Manager of Utilities for the city and Mr. Frank E. Elsey, Electrical Superintendent.

Most unusual and outstanding in connection with the acquisition of her present Power Plant and Distribution System by the City of Hominy has been the persistent and capable manner in which the City's Attorney, Mr. Leander Hall, has handled the mass of litigation that has been instituted by these forces opposed to municipal ownership and operation of Public Utilities.

The Hominy municipal Diesel plant presents a pleasing exterior. At the left is the Marley cooling tower for engine jacket water.

In Nine Years CHES has Installed 16

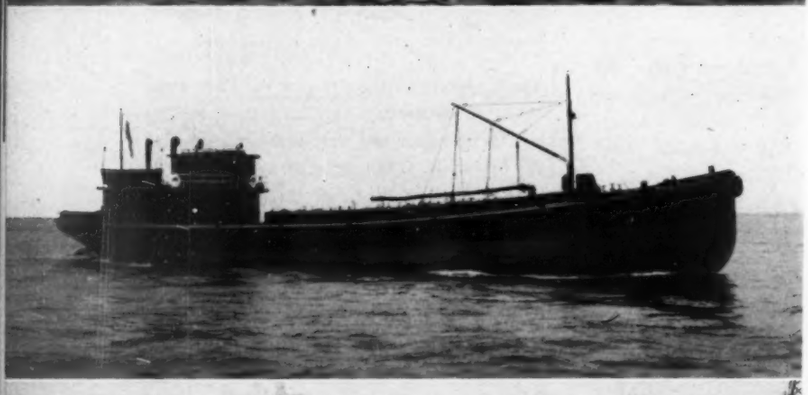


CHESTER A. POLING

At top, a drawing of the new tanker "POLING BROS. *H. Mathis Company. The dimensions are* x 30 *6-cylinder 13" x 16", 380 hp. Atlas Diesel main engine Diesel for the cargo pumps.*

Bottom picture is the tanker "POLING BROS. No. 4," *gallons, carries a 6-cylinder, 8½" x 12", 140 hp. direct r*

"POLING BROS. No. 9" *a tank barge of 579,000 gallons capacity, employs two 4-cylinder, 6" x 8" 60 hp. Atlas Diesels as cargo pump power.*



The tanker "POLING BROS. No. 5" 104.6 x 22.3 x 6.5, *with a capacity of 53,000 gallons, carries a 6-cylinder 9" x 12" 160 hp. Atlas Diesel as the main engine.*

The tanker "POLING BROS. No. 6," *with a capacity of 171,000 gallons, employs two 3-cylinder 6" x 8" 45 hp. Atlas Diesels to drive the cargo pumps.*

The tank barge "POLING BROS. No. 15," *with a capacity of 714,000 gallons, carries a 6-cylinder 7" x 8½" 120 hp. Atlas Diesel for cargo pump service.*

CHESTER A. POLING, INC., of New York, one of the leading marine transporters of bulk petroleum products, had its inception in 1909 and began operations with a small fleet having a total carrying capacity of 2,400 gallons.

Much water has gone over the dam in the intervening years, but through persistent and intelligent effort, coupled with the headaches and sleepless nights that are always incident to success in a large measure, Chester A. Poling and his brother, Robert L. Poling, have increased their carrying capacity to a present 3,292,000 gallons.

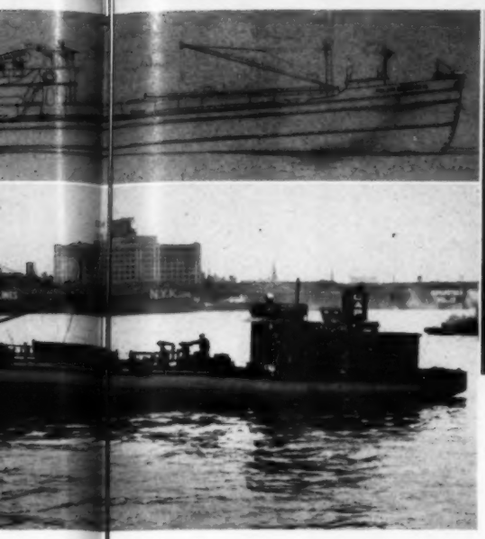
Today the familiar C.A.P. appears on seventeen vessels, twelve of which are self-propelled tankers and five non-propelled barges. Their range of operations covers the Atlantic Coast from New England to the Carolinas. A floating service station at City Island, New York, supplies innumerable yachts, motorboats and miscellaneous craft, and a special delivery boat caters to the fishing fleet of the famous Fulton Fish Market.

Since 1928, when Poling Brothers bought their first Atlas Diesel, they have bought these engines exclusively for propulsion purposes. Today they own and operate a

ATLAS IMPERIAL DIESEL ENGINE CO.
OAKLAND, CALIFORNIA
115 BROAD STREET,

ATLAS IM

ESTER A. POLING, Inc., 6 ATLAS DIESELS



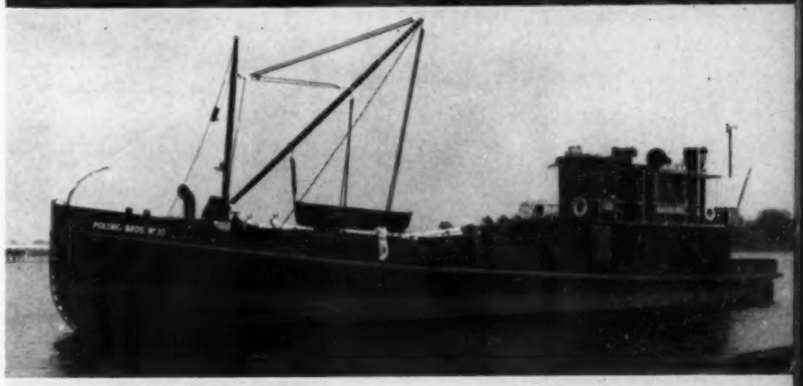
nker "POLING BROS. No. 16," *now under construction by John*
mensions are 130 x 30 x 12; 200,000 *gallons capacity, with a*
as Diesel main engine and a 4-*cylinder* 7" x 8½", 80 *hhp. Atlas*

LING BROS. No. 4," 100" x 19.1" x 9", *with a capacity of* 48,000
" x 12", 140 *hp. direct reversible Atlas Diesel as the main engine.*

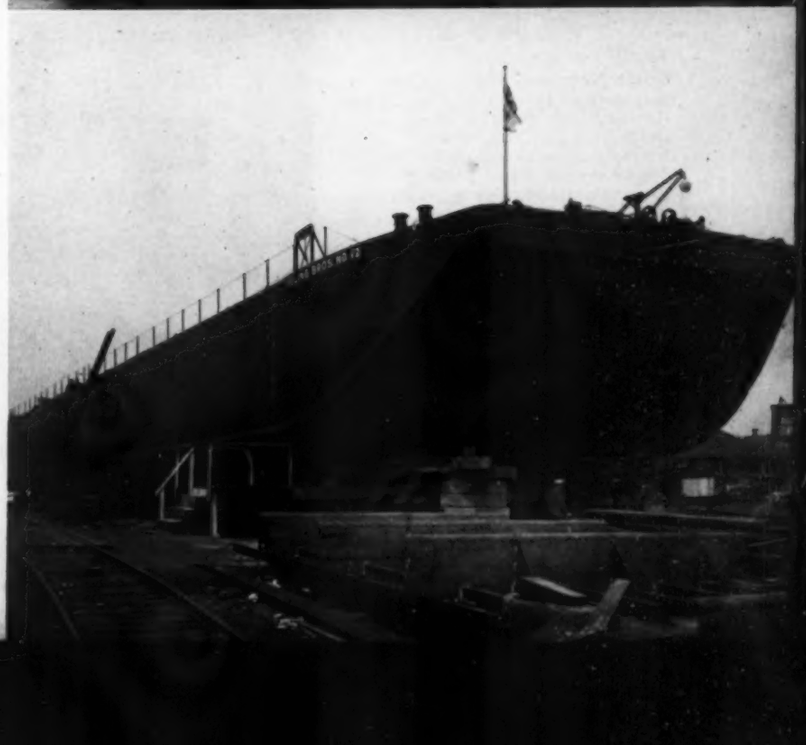
ROBERT L. POLING

The tanker "POLING BROS. No. 3" 110.7 x 25.2 x 5.3, *with a capacity of 66,000 gallons, carries a pair of* 4-*cylinder* 7½" x 10½" 70 *hp. Atlas Diesels for propulsion.*

The tanker "POLING BROS. No. 14" 125 x 27 x 9, *with* 147,000 *gallons capacity, is powered by a* 6-*cylinder* 11½" x 15" 275 *hp. Atlas main engine and a* 4-*cylinder* 7" x 8½" 80 *hp. Atlas Diesel for cargo pump power.*



The tanker "POLING BROS. No. 10," *with a capacity of* 79,000 *gallons, utilizes a* 3-*cylinder* 6" x 8" 45*hp. Atlas Diesel to drive the cargo pump.*



The tank barge "POLING BROS. No. 12," *with a capacity of* 714,000 *gallons, carries a pair of* 4-*cylinder* 7" x 8½" 80 *hp. Atlas Diesels as cargo pump engines.*

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total of sixteen Atlas Diesels as both main and cargo pump engines. Their continued preference for the Atlas Diesel is attributable to two reasons. First, these heavy duty slow speed Diesels have exactly the characteristics required in tanker service. Secondly, Atlas maintains in New York an engine service department second to none.

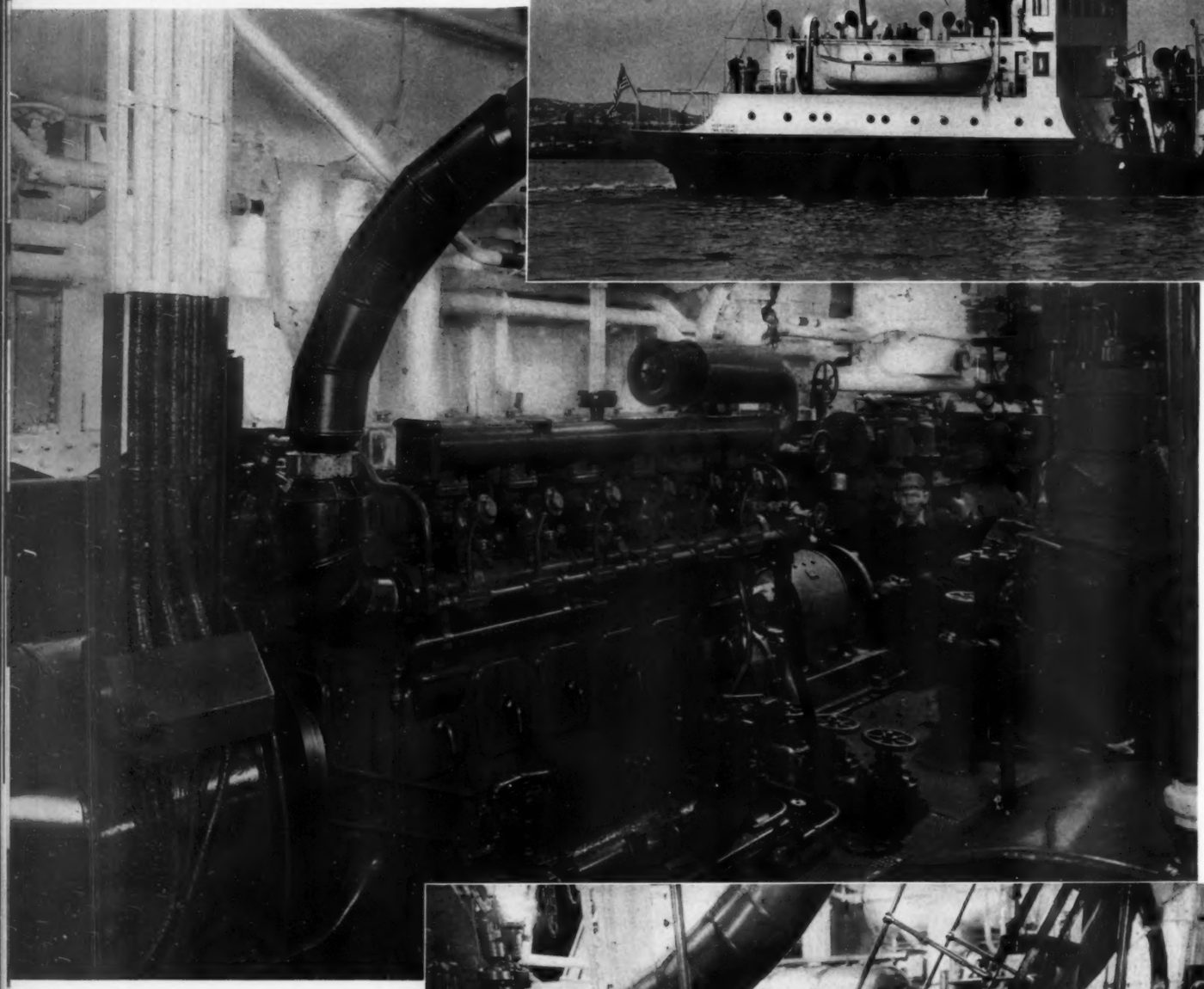
The temperament of a high speed Diesel, which might be indulged by a pleasure craft owner, cannot be countenanced by the owner of a workboat, who places dependability and economy above all other requirements. These two characteristics, coupled with efficient service departments at strategic points, has made the Atlas Diesel the undisputed favorite among workboat owners on the Pacific and Gulf Coasts, and on the Atlantic Coast. Atlas popularity is steadily increasing year by year.

When you build a new boat or repower an old one, get an appraisal of Atlas Diesels from such successful fleet operators as Chester A. Poling, Inc. If you have neither the time nor money to experiment with this engine and that—bank on the experience of successful fleet operators who have built their business with Atlas Diesels.

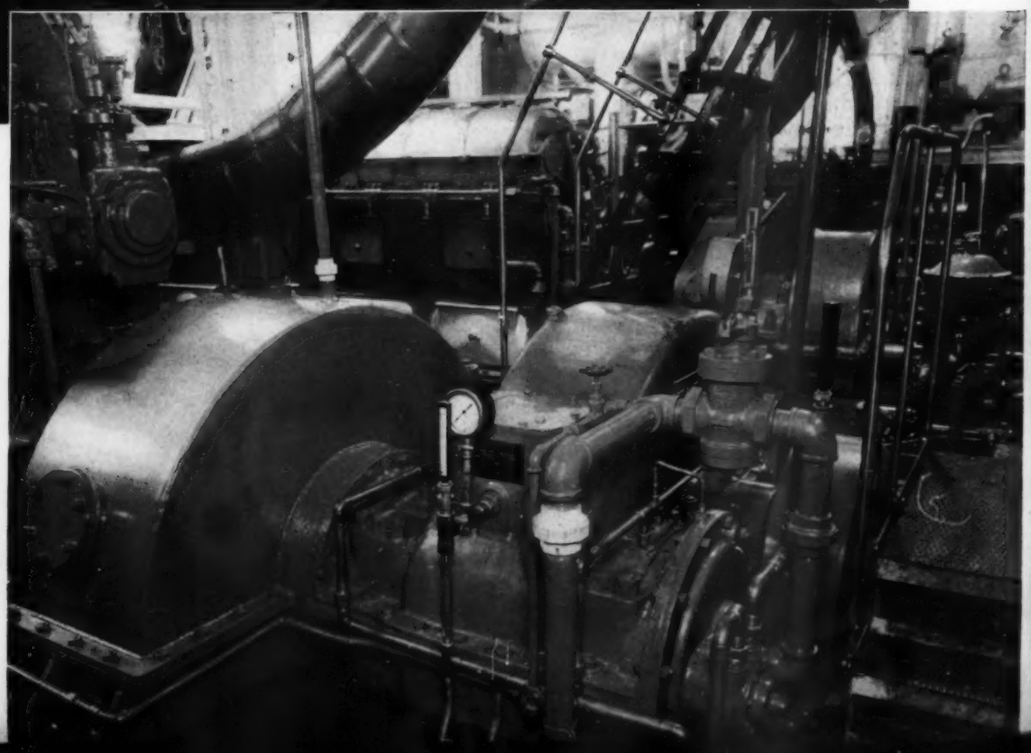
RIAL DIESEL ENGINE CO.
RNIA • MATTOON, ILLINOIS
ROAD STREET, NEW YORK

IMPERIAL

Broadside view of the "Pacific" on dredging trials which were eminently satisfactory.



In the foreground above appears one of the two 75 kw. Winton Diesels driving a General Electric generator. Below are the two sets of Vulcan hydraulic couplings and Farrel-Birmingham reduction gears through which two 400 hp., 8 cylinder Winton propulsion Diesels drive the propellers.



U. S. ARMY ENGINEERS' DREDGE "PACIFIC"

By F. HAL HIGGINS

As the newly constructed sea-going hopper dredge *Pacific* recently completed her trials here on San Francisco Bay, U.S.E.D.'s principal engineer, F. C. Scheffauer, paused a few moments to give readers of DIESEL PROGRESS a statement regarding performance.

"The *Pacific* made her speed trials on Sept. 2nd, her dredging trials on Sept. 3rd, and she gave a highly satisfactory performance in every respect," Mr. Scheffauer summed up the trials. "The trials demonstrated she will be a very useful and efficient dredge of its type."

The combination of the Bethlehem Shipbuilding Corporation and the United States Engineering Department, of course, is ample assurance of a product worthy of these two famous names. The old Union Iron Works, where the *Pacific* was built, San Francisco subsidiary of Bethlehem, goes back to '49, when Donahue of San Francisco founded the largest plant on the Pacific Coast for the handling of the marine and mining demands of the Gold Rush days.

From Mr. Scheffauer's notes, here are the points of interest in the new Diesel-powered hopper dredge *Pacific:*

This dredge was built to conform with the American Bureau of Shipping rules for Class A-1 in this type of seagoing construction, and her equipment for navigation, safe working conditions, and safety in sea emergencies exceeds the latest requirements of the Bureau of Marine Inspection and Navigation.

The *Pacific* is a seagoing hopper dredge of the twin-screw, twin-rudder, side-pipe, all steel type, with the following general characteristics:

Length overall	180 ft. 3 in.
Length B.P.	168 ft. 0 in.
Beam	38 ft. 0 in.
Depth amidships	14 ft. 0 in.
Draft, light, forward	5 ft. 0 in.
Draft, light, aft	7 ft. 7 in.
Draft, fully loaded, mean	10 ft. 10 in.
Displacement, light	865 tons (long)
Displacement, loaded	1,600 tons (long)
Propulsion power	800 B.H.P.
Propellers	2
Speed, light draft	11.5 miles
Speed, loaded draft	9.8 miles
Fuel tank capacity	300 bbls.
Cruising radius	2,200 naut. miles
Complement:	
Officers	11
Men	27

(NOTE: As given is above table, light draft is for hopper gates open, fuel and water aboard; loaded draft is for 500 cubic yards of sand in hoppers and full load of fuel, water, and stores; and complement is for three shift, two dragpipe operation.)

The hull and superstructure of the dredge *Pacific* is entirely of steel, wood construction being limited to furniture. Compartment division is so arranged that the dredging pump room is forward of the hoppers. This layout provides a satisfactory and logical location of engine room, hoppers, crew's quarters and dragpipes with their operating equipment. For a dredge of this size the arrangement of compartments on the *Pacific* is considered ideal.

Alloy steels of special characteristics were used for all hull and dredging machinery parts where their use is indicated by the conditions of service. This treatment includes all parts of the hull exposed to special wear, and the inclined sides and ends of the hoppers. These surfaces are of one piece plate construction and with welded fastenings to prevent leakage.

This use of alloy steel has resulted in considerable weight saving, a very necessary consideration in the design of such a light draft vessel.

Many of the castings required for fittings to the hull and machinery will be subjected in use to pressure, strain and shock, and so need to be of special strength. Wherever this is the case, the specifications called for special alloy steels. A number of these castings were supplied by the General Metals Corporation of Oakland, California, who maintain a foundry, also a metallurgical laboratory, specializing in carbon steel and alloy steel castings.

The two propulsion power units are eight cylinder, direct reversible, medium speed Winton Diesels, each developing 400 shaft horsepower at 450 rpm. These engines are connected to the propeller shafts through hydraulic couplings furnished by the Hydraulic Coupling Corporation and mechanical reduction gears furnished by the Farrel-Birmingham Company. When the engines are running at 450 rpm., the propellers turn 130 times a minute.

Propellers for this type of service demand special design. They must deliver strong towing effort at the customary dredging speeds, two or three knots and efficient propulsive efficiency at nine knots. As the propellers must not only take care of the water resistance to the progress of the hull, at slow speeds and often against strong tidal currents, and must also overcome the draghead resistance on the sand or mud bottom, they are designed along approved towboat practice, resulting in four-bladed wheels, 7 ft. 6 in. in diameter and with 9 ft. 6 in. pitch.

Cutless rubber bearings are installed in the stern tubes and struts, and between the strut and the stern tube each shaft runs in a steel watertight tube to prevent sand laden water from entering the bearings. Water lubrication for these rubber bearings is provided by the

discharge of the circulating water cooling system. This method assures forced lubrication of the bearings whenever the engines are running. Between the after end of the struts and the propeller bosses the shafts are protected by steel plate rope guards.

A fresh water cooling system is installed to take care of the cylinders of all the Diesel engine units on the ship except the 10 kw. emergency generating set, which is radiator cooled. The circulating water cooler was furnished by the Condenser Service and Engineering Company and the circulating pumps by the Nash Engineering Company.

Wrought iron was specified for many uses on this dredge. Genuine wrought iron plates were used for: Two cylindrical potable fresh water tanks, and two tanks for engine circulating fresh water. Genuine wrought iron pipe was used in: Waste and sanitary piping systems; deck drains; stern tube lubricating system; fire, bilge, engine cooling, dredging pump priming, and hydraulic gear flushing system, and hand rails, stanchions, scuppers and ladder rungs in ventilators. All of this wrought iron was furnished by the A. M. Byers Company.

A single 18 in. suction dredging pump of the type developed by the U.S. Army Engineers is driven by a directly connected, direct current, 240 volt General Electric motor with a normal rating of 340 hp., but with an overload capacity enabling it to run at 425 hp. indefinitely without overheating. This pump ranges from 210 to 250 rpm. The pump motor is directly coupled with a 275 kw. 240 volt General Electric direct current generator directly connected to a 400 hp. 8 cylinder Winton Diesel engine.

Complete dragpipe, suction, and discharge systems are installed on both port and starboard sides of the hull. It is contemplated that the dredge will ordinarily operate with one dragpipe, but choice of either sidepipe must be had at all times for efficient work on Pacific Coast bars. Under favorable bar channel conditions and in quiet water operations it may be found practicable to dredge advantageously with both dragpipes at one time.

The dredging pump motor, the priming of the dredging pump, the hydraulic rubber-seated valves in the pump suction lines, and the check valve in the discharge line from the pump are all controlled from a station on the deck just forward of the hoppers and at the hopper walkway level. The dredging pump will ordinarily be self-priming, but a Nash Hy-tor air exhauster priming pump has been provided in the dredging pump room to ensure rapid priming under all conditions.

Each of the auxiliary sets consists of a General Electric 75 kw. 240 volt D.C. generator directly connected to a Winton Diesel engine.

The ball joints on the dragpipes are made tight by a rubber seal. The inner ball is rubber covered over the working portion of its surface, and the outer ball has an insert rubber gasket ring which bears on this rubber surface of the inner ball at all positions of the dragpipe, thereby effectively preserving the seal.

Covering this large inner ball with a special rubber compound vulcanized in place is considered a rather unusual and difficult technical feat. The rubber was provided and applied by the Universal Rubber Corporation of San Francisco, manufacturers of mechanical rubber goods.

Means have been provided for ready connection or disconnection of the dragpipes to the hull inlet fittings and the stowage of the dragpipes on the main deck alongside of the hoppers. This stowage enables convenient changes and repairs to be made to the dragpipe parts, permits better berthing of the dredge and provides a better seagoing condition for the dredge when transferring between works. A special type of portable stay has been developed for staying the dragpipe elbow at hull inlet.

Dragpipe davits are the type developed for and used successfully on the dredge *Culebra* in its Pacific Coast bar work. The after davit has an outboard reach of 8 ft. for clearance between draghead end of the pipe and the vessel's side. Both forward and after davits have a special twin spring suspension gear for easing shocks on the gear and both davits hinge inboard for stowage of the dragpipe and themselves. Davit blocks are ball bearing, and wire rope slings have been used in lieu of chains for suspension. Hydraulic topping gear for the davits are installed for safety and reliability in operation. The hydraulic gear for the forward and after davits of the side are controlled by Critchlow hydraulic valves located at the davits. An auxiliary safety lead is provided for each davit when topping is done.

Dragpipe hoisting winches are designed for electric motor drive through worm and worm wheel. The drums are designed with variable diameters to provide straight line dragpipe conditions at all angles of inclination and for even lifting of the dragpipe from its horizontal position in line with the hull inlet center, to its stowage position on the main deck when the pipe is disconnected from the hull inlet fitting. The winches are provided with dynamic braking in all lowering points, with a magnetic brake on the motor shaft, and a hand brake on the hoisting drum proper for additional safety when but one hoist is being attended under single pipe dredging conditions. The hoisting winches are controlled from the drag tender's cabs.

Located at about the hopper top level, these winches are readily accessible from the hopper walkways, and from this position satisfactory leads are practicable through fair leader sheaves to the upper blocks of forward and after dragpipe davits. The winch and the fair leader blocks are designed with ball and roller bearings to reduce friction. Speed of lift of the draghead off the bottom is about one-half foot per second, or about one hundred feet per minute on the main winch drum lead.

The hopper capacity is changed from 300 cubic yards to 500 cubic yards by lowering the weir gates provided at the hopper sides and thus

Emergency power and lighting is furnished by this 10 kw. Buda Diesel generating set.

changing the hopper overflow level from under the weir gates to over them. These weir gates are made watertight by rubber strip sealing devices, and each weir gate is provided with two small, readily opened gates for emergency discharging of a part of the load when the dredge is grounded under the 500 cubic yard loaded condition. The weir gates are operated hydraulically. Racks and gears, and a connecting shaft provide assurance of even lift for each weir gate.

The hopper dump gear is of the standard hinge individual gate and vertical ram type and is hydraulically operated from cylinders at the hopper walkway level. Hydraulic power for all purposes except the steering gear is provided by an electric drive hydropneumatic plant installed in the engine room. Oil is used for the hydraulic fluid.

A depth indicator to show the dredging depth below bottom of dredge at all times is provided on port and starboard sides in view of the pilot house and the drag tenders' cabs. The indicators are fitted with a movable scale which may be readily adjusted for various project depth settings and for draft and tidal stage corrections. Liquid draft gauge dredging indicators are fitted in each drag tender's cab.

Pilot house and bridge are combined in one structure of the totally enclosed type on account of the generally severe climate in which the dredge will operate. The deck officer has a complete view of all the dredging operations from the bridge, which is also well located for navigating and ranging in the vessel when dredging. Engine room telegraphs are provided in the pilot house and one each at the port and starboard bridge ends. Large voice tubes are provided for direct communication between the bridge and the drag tender's cab below.

Included in the equipment on the bridge are: Compasses and a barometer and a chronometer furnished by Louis Weule and Company; a clear vision screen furnished by the Chas. Cory Corp.; a rudder indicator furnished by the Sperry Gyroscope Company; a steering telemotor furnished by the American Engineering Company; a Sperry searchlight, and a radio compass.

The twin rudders are operated normally by an American Engineering Company hydro-electric steering gear. A spare motor and pump are installed and connected up for immediate changeover in case of emergency. Tillers and emergency relieving tackles are also provided for main deck operation. The main deck aft is fitted with an American Engineering electric capstan for warping, emergency steering, and other purposes. On the forecastle is mounted a Hyde electric motor driven windlass.

There has been excellent arrangement of spaces for living rooms of officers and crew; for galley and messrooms; and for refrigeration and dry storage spaces. A very interesting feature is the use of stainless steel, in "Diamondette" non-skid pattern on the galley floor to get away from the great weight of ordinary steel deck plus cement and tile construction. Stainless steel is lavishly used for dressers, cupboards, and other galley furnishings and trim, and the sinks are of Monel metal.

The galley range is the Ray Oil Burner, built in San Francisco. The refrigeration system for gallery perishable stores were furnished by Carrier.

In all of the officers' and crew's quarters all inside surfaces of steel exposed on its outer surface to sea or weather are heavily insulated with cork board.

In the machine shop on the flat aft of the engine room there have been installed a Peerless Machine Company electric motor-driven hack saw; a United States Electric Tool Company motor-driven grinder; a Buffalo Forge Co. electric motor-driven drill press, and a South Bend Lathe Works electric motor-driven engine lathe.

A 10 kw. Buda Diesel electric generating set, radiator cooled, is installed in the engine room exhaust hatch at the poop deck level for emergency and port service.

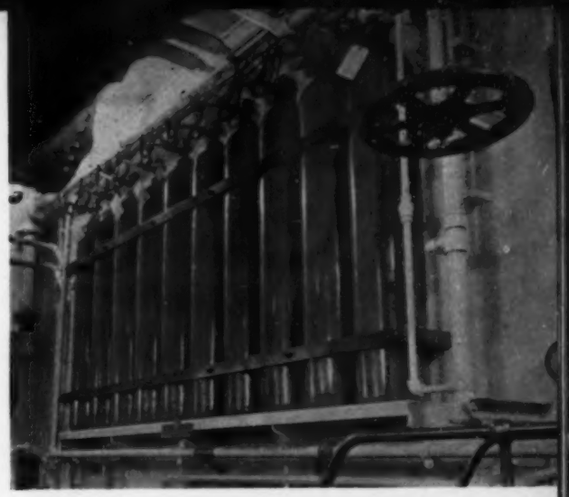
The watertight compartment division of hull spaces is in excess of that necessary to meet the requirements for trim condition with any two compartments flooded and with full load of oil and water and 300 cubic yards of wet sand in the hoppers. Even with 500 cubic yards of sand in the hoppers, these conditions are reasonably met.

On each side of the hull there is provided life boat capacity for every member of the crew. In addition, there is provided life raft capacity for the total crew. Life preservers for each man are conveniently stored in crew's quarters and another full complement of life preservers in two boxes on deck. The life boats and the davits from which they swing are Welin. The life rafts are of balsa. Hyde Windlass Co. furnished the boat hoists.

An elaborate salt water piping system, served by a Nash Engineering Co. high pressure pump and with suitable hydrant and hose reel outlets, guards against all general fires. In machinery spaces the carbon dioxide system furnished by Walter Kidde and Co. is installed for practically instantaneous fire smothering.

For use when the *Pacific* is on station a 24-foot motor boat is provided. This boat stows on deck when the dredge is transferring between stations at sea and will be hung on one pair of the life boat davits when the dredge is at work on a location.

Much time and study have been devoted to incorporating in this design all the experience



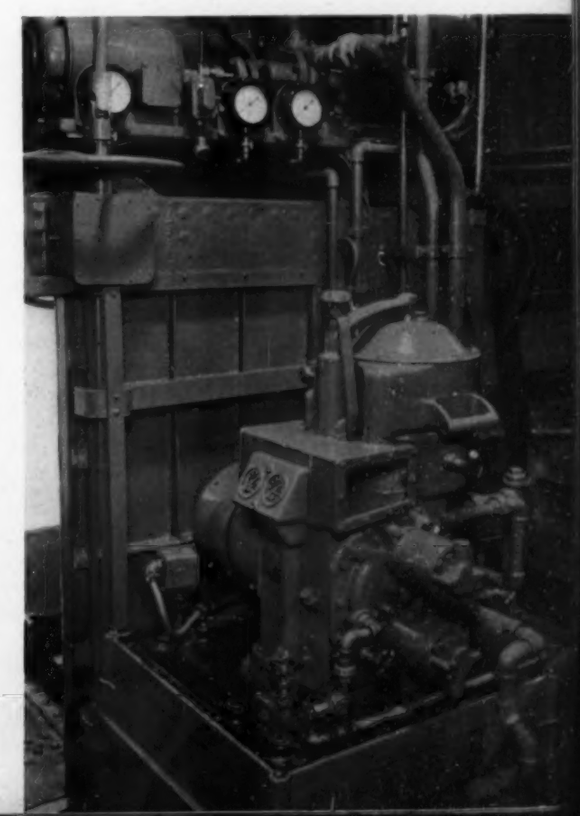
A battery of ten tanks of CO_2 gas which forms a part of the Lux remote control fire extinguishing system on the "Pacific." The above tanks protect the engine room only.

gained in many years of dredging Pacific Coast bar channels.

The dredge *Pacific* was built under the direction of Col. John J. Kingman and Col. T. M. Robins, Division Engineers of the two Pacific Coast Division Offices of the U.S. Engineer Department. Lieut.-Col. J. A. Dorst, District Engineer of the San Francisco District, was the contracting officer. Principal Engineer F. C. Scheffauer had full charge of the design and construction of the dredge, assisted by Senior Engineer H. D. G. Baxter and Naval Architect H. A. Lennon.

Mr. C. H. Giroux, head engineer, and Mr. H. H. Haas, senior engineer, both of the Marine Design Division, Office of the Chief of Engineers, Washington, D. C., were present during the trial period of the dredge and supervised the electrical and engine tests.

Lubricating oil for the five Winton Diesels is purified by this compact De Laval purifier unit.



The DeLaVergne Diesel installed in 1923 will carry the after-midnight load.

FORREST CITY, ARKANSAS

By ORVILLE ADAMS

FORREST CITY bought a privately owned power plant in 1909, an old steam plant for which they paid $11,000, and which they operated at a loss for more than twelve years. Even with a rate of 20 cents per kilowatt paid by the people and an equally high water rate, the old steam plant kept the city in debt from year to year, until 1921, when further operation as a municipal plant seemed a hopeless proposition.

However, Mr. Clifford Barton, Superintendent, took over the job of running the town's municipal water and light plant in 1921 and immediately recommended Diesel engines as a solution to the problem. Accordingly, two DeLa Vergne oil engines, horizontal type, rated at 100 hp. and 200 hp., respectively, were installed. Reliability was restored and the confidence of the people in municipal plants was likewise restored when it was found that the engines shortly paid for themselves. The load rapidly increased with lower rates and more reliable service, and within two years the city required an additional engine, this time purchasing a 330 hp. DeLaVergne engine of the vertical full Diesel type. For five years the city made rapid progress, earned considerable money each year over and above operating expenses. A new power plant was planned, extensions were made to the light and water works, and before the close of 1928, a new engine was found necessary to handle the peak load, this time a 720 hp. Fairbanks-Morse engine being purchased to meet this demand. Continued progress and expansion, with increased economies of operation, enabled the city during the depression to lower the rates still further, increase the load and earn enough money to practically run the town's many activities. In 1921, the 20 cent rate was reduced to 15, and later to 10 cents, but by 1928 a rate of 8 cents for the first 50 kilowatts and 5 cents for additional consumption went into effect. Still lower rates for commercial and cooking were authorized. The revenue in the meantime had increased from 30,000 dollars in 1921 to more than $100,000. During the latter years the plant has handed more than $25,000 a year over to the city as net profit, after paying all possible expenses, including sinking fund requirements, underwriting a new power plant building and making numerous rural line extensions.

During the trying days of the depression, the profits of the municipal plant carried the city over a number of difficult times, and with the money available, the various city activities were kept up that would otherwise have been neglected or altogether abandoned without this constant source of revenue, according to Mr. Barton. The people will long remember, he says, the advantages of the municipal plant's income and the economies of the Diesel power plant.

The operation of the plant has been outstanding. Under the direction of Mr. J. J. O'Fallon, Chief Engineer for well on to three decades, the plant has been kept up to high efficiency and reliability maintained by reason of careful and intelligent operation. Outages and break-

The DeLaVergne 1,000 hp. Diesel installed in 1937 will handle the peak load.

downs have been few, even without standby capacities during long periods, indicating the reliability of the engines.

Typical load and output figures per month are shown below:

January 1937	202,000 kw.
February	194,500
March	196,200
April	213,000
May	222,200
June	256,000
July	260,000

The total production in 1935 was 2,133,200 kwh., which increased to 2,457,600 for 1936. With rural line and city extensions, the 1937 production is expected to increase another half million kilowatt hours. The total revenue taken in by the city is now well over $100,000 for the light and water plant. The profits of the light plant are being applied to retiring $14,000 sewer bonds and $6,000 paving bonds, the city having no tax rate for sinking fund. And in addition, the plant furnishes the street lights, fire department and other city buildings power and light free of charges. When the new engine was purchased this year, the city was able to pay $30,000 cash and is paying the balance out in six months, this on an installation that cost well over $80,000 for engine, new switchboard and installation cost.

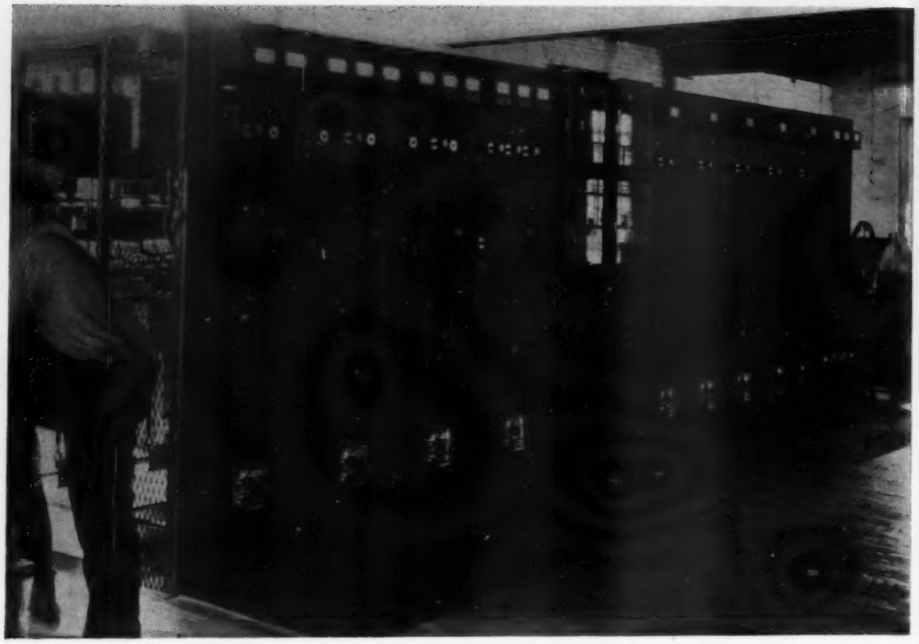
The new engine is equipped with every required adjunct to economical and successful operation, including a battery of American Air Filters, Alnor Pyrometer, a Hydroil centrifuge for the lubricating oil, an oil cooler, the S. & K. type, together with Woodward Governor. The fuel is supplied at 4.38 cents per gallon by the Henry H. Cross Company, Chicago and Smackover, Ark., the fuel being 28-30° gas oil of the best quality.

The new Diesel 1,000 hp. DeLaVergne was

placed on order late in 1936, and installed in the Spring of this year. It had been in operation approximately three months at the time the writer visited the plant late in August. Many new pieces of equipment were added when the engine was installed, including a complete new switchboard, a centrifuge and additional starting equipment. A cooling tower is to be built immediately, the cooling heretofore having consisted of repumping the water back into the city reservoir.

Forrest City, Arkansas, is one of the very few municipal plants in this state. It is the top flight plant for successful operation, economy and growth, and has demonstrated in cool figures the advantages of a town of this size in having available revenue from municipal utilities for continued improvement and upkeep of the city.

Restrictions and limitations imposed by state law on towns and cities in Arkansas as to rate of taxation and bonded indebtedness are such as to discourage the growth and development of a municipal light and power project. In all of the state there are only a half a dozen such plants. Those towns which had an early start and whose citizens had the courage to carry on through the years, like Forrest City, now possess great advantages and enjoy the profits from municipal operation that are denied the other cities. Understanding these things, the people of this progressive little city, fifty miles west of Memphis, Tennessee, are proud of the Diesel plant. Much credit is due the city officials in the present and past administrations because of their attitude in meeting the problems incident to handling the light and water plant development. An outstanding feature of the municipal utility policy was the selection of an able utility manager, and giving him practically a free hand. Sound management and enthusiasm for achievement has for more than a decade been noticeable in the handling of the light and water works. Given a Diesel Plant, you can't beat that kind of combination, a leading citizen said to this writer. What Forrest City has done and is doing cannot only be seen but felt very definitely upon contact.



The new switchboard added this year, with complete instruments for each engine.

Battery of American air filters which protect the new 1,000 hp. Diesel.

The 720 hp. Diesel in service since 1928 is equipped with a Maxim silencer, an American Air Filter and a Brown Pyrometer. The engine has in this time operated for long periods each day practically at full load. In parallel with the 330 hp. engine, it has carried the peak load for almost ten years without standby other than the two small engines, one of which was sometimes necessary to meet unusual peaks. However, since a local mill installed its own Diesel plant, the peak demand has not been so severe on the city plant. According to Mr. J. J. O'Fallon, chief engineer, there has never been a time when the city light failed, or was off the line for more than a few moments.

Now that the new 1,000 hp. Diesel is in service, there is practically 100 per cent standby for any expected peak. Consequently, Mr. Barton says, the city is accepting rural extension and will build up an increased load very rapidly. A number of such rural extensions have been projected. Water is obtained from deep wells, additional capacity is to be put down, and further extension of the water works system is planned.

The new cooling tower to be designed and built as the next plant improvement will be sufficiently large to handle a future unit which may be required within a few years. This new tower will be built by local men and the plant force at a considerable savings.

Practically all the transmission system has been or will be revamped, now that the plant and building are paid out. The complete new switchboard installed this year with the new engine is equipped with a complete set of new instruments for each unit in the plant, so that detailed figures on the operation and production of each engine can be accurately determined, and accurate data accumulated as to the fuel economy and operating cost.

At the present time, a series of tests on the new unit indicate much better than acceptance requirements have been realized. The fuel consumption of the new unit is 11.4 kwh. per gallon of fuel. The lubricating oil used averages roughly three gallons per day, or about 6,000 kwh. per gallon. The new engine is a four cycle, solid injection DeLaVergne, heavy duty type. It now carries the entire peak load and operates over the full range while another unit is being overhauled. During this period, complete test data being accumulated.

Servicing Deutsche Lufthansa airliners at Templehof Airport, Berlin.

DIESEL AIRLINES IN EUROPE

By PAUL H. WILKINSON

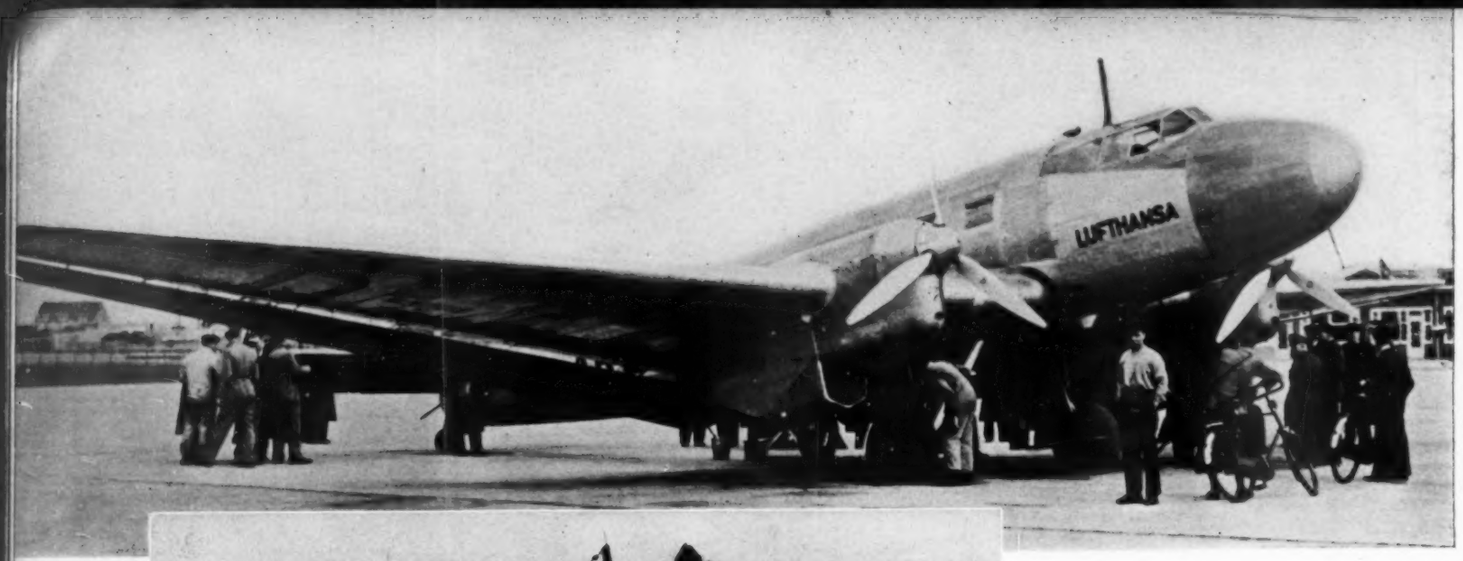
PEOPLE who think of the Diesel for aircraft as merely an interesting experiment, doubtless will be considerbly surprised to hear how rapidly Diesel aviation is spreading in Europe. While only two or three cities in this country have actually seen a modern Diesel-engined plane, most of the larger cities abroad are well acquainted with this ultra-modern product. Berlin, Amsterdam, Zurich, Vienna, Warsaw and Copenhagen—all have Diesel-engined planes operating from them on regular schedules, and whenever these new planes visit London and Rome, they attract the greatest attention.

These planes are used, of course, on many of the airline routes in Germany. During the summer of 1937, Deutsche Lufthansa had at least forty Diesel-engined planes in service and by now undoubtedly this number has been considerably augmented. In their fleet were included:—

Junkers *F 24*	1 "Jumo" 204	8 planes
Junkers *G 38*	4 "Jumo" 204	1 plane
Junkers *Ju 86*	2 "Jumo" 205	25 planes
Dornier *Do 18*	2 "Jumo" 205	4 planes
Hamburger *Ha 139*	4 "Jumo" 205	2 planes

The latest news from Swissair, the well-known Central European airline, relative to the Diesel situation, is most interesting. In a report just received, they say: "For your information we would like to state that for the second year we are flying a regular transport line with that type of machine. Last year it was the night-mail Basle-Frankfurt, and this summer season the Junkers *Ju 86* is in regular operation over the 600 km. (372 miles) direct route Zurich-Vienna and back to Switzerland. The ship flies regularly 1,200 km. (744 miles) a day on that schedule. The policy of the Company is to gain experience with Diesel engines as this type of powerplant is already a serious competitor for the ordinary gasoline engines."

To check up on the operation of Diesel-engined transport planes, one can refer to the "Reichs Luftkursbuch", which is a complete international timetable of all the airlines in the World and their equipment. From it one can readily ascertain the routes on which these craft are operating and the mileage they cover. At present their flights seldom are more than 400 miles in length—in fact, 300 miles is about the average and this usually includes at least one intermediate stop. Last May, these flights of from one to three hours' duration totalled



One of Deutsche Lufthansa's Junkers Ju 86 airliners at Amsterdam, Holland.

Refuelling a Diesel-engined transport plane.

An airliner coming in to land.

nearly 60,000 miles a week, which proves conclusively the efficiency and economy of the Diesel for *short-range* transportation.

Despite these obvious facts, Ivar L. Shogran, powerplant engineer of the Douglas Aircraft Co., in his paper entitled "Aircraft Engine Installations" presented to the California Section of the S.A.E. last April, stated: "Diesel engines for aviation do not show any advantages over gasoline engines except in long-range service

A Swissair transport plane at Zurich, Switzerland.

where the plane is in flight over approximately 12 hours." If Mr. Shagran had read the aviation articles which have appeared in DIESEL PROGRESS each month since November, 1935 however, and had read his DIESEL AIRCRAFT ENGINES (written two years ago), and had taken the trouble to obtain the latest information on the subject, he could hardly have made such an error. It is generalities such as this, without figures to support them, that are so harmful to the progress of aviation.

With regard to engine weight, which so often is offered as an argument against the Diesel, it is true that three or four years ago it required a flight of 12 hours' duration before the weight of the Diesel plus its fuel was equal to that of the gasoline engine plus its fuel. Since then, great progress has been made with the Diesel and the accomplishments of three or four years ago certainly cannot be used as a yardstick with which to measure its achievements today. At the present time, 4 hours is the deciding time/weight factor and since most transport planes carry fuel for a flight of this duration, for all practical purposes Diesel engine weight, even though it be that of a liquid-cooled engine, can be disregarded altogether.

With regard to fuel consumption and fuel cost, in 1936 the consumption of gasoline by the airlines and private fliers in the United States and by our airlines to other countries, amounted to 47,508,565 gallons. Assuming that aviation gasoline costs $0.20 a gallon, this involved an expenditure of $9,501,713. If our planes had been Dieselized, however, this would have been reduced to 38,006,852 gallons inasmuch as the Diesel consumes only 80 per cent of the fuel required for the gasoline engine. Furthermore, since Diesel fuel certainly should not cost more than $0.10 a gallon, our fuel bill would have been reduced to $3,800,685. This represents a saving of $5,701,028 for civil aviation for one year, and to this must be added a corresponding amount for our military services.

SCHEDULED FLIGHTS OF DIESEL-ENGINED AIRLINERS FROM "REICHS LUFTKURSBUCH," MAY, 1937

	(Deutsche Lufthansa)	Germany-Holland	(Equipment: Junkers *Ju 86*)
0	11.35 lv.	Berlin	ar. 18.10
157	12.45 ar.	Hanover	lv. 17.00
	13.00 lv.	Hanover	ar. 16.45
206	15.00 ar.	Amsterdam	lv. 15.35
363 miles			

	(Deutsche Lufthansa)	Germany-Poland	(Equipment: Junkers *Ju 86*)
0	13.50 lv.	Berlin	ar. 10.55
145	15.00 ar.	Posen	lv. 09.40
	15.20 lv.	Posen	ar. 09.20
175	16.40 ar.	Warsaw	lv. 08.00
320 miles			

	(Swissair)	Switzerland-Austria	(Equipment: Junkers *Ju 86*)
0	08.10 lv.	Basel	ar. 18.45
50	08.35 ar.	Zurich	lv. 18.20
	09.15 lv.	Zurich	ar. 17.55
372	12.00 ar.	Vienna	lv. 15.10
422 miles			

Passengers boarding a Junkers Ju 86 airliner at Tempelhof Airport.

MONTROSE CLAY PRODUCTS CORP.

By JOHN W. ANDERSON

A FEW miles south of Peekskill, just off the New York-Albany east bank road at Montrose, N. Y., stands the plant of the Montrose Clay Products Corporation. It was established several years ago by the H. W. Bell Company of New York City, dealers in builders supplies. The principal items made at this plant are hollow drain tile and clay tile, materials for which are obtained on the property.

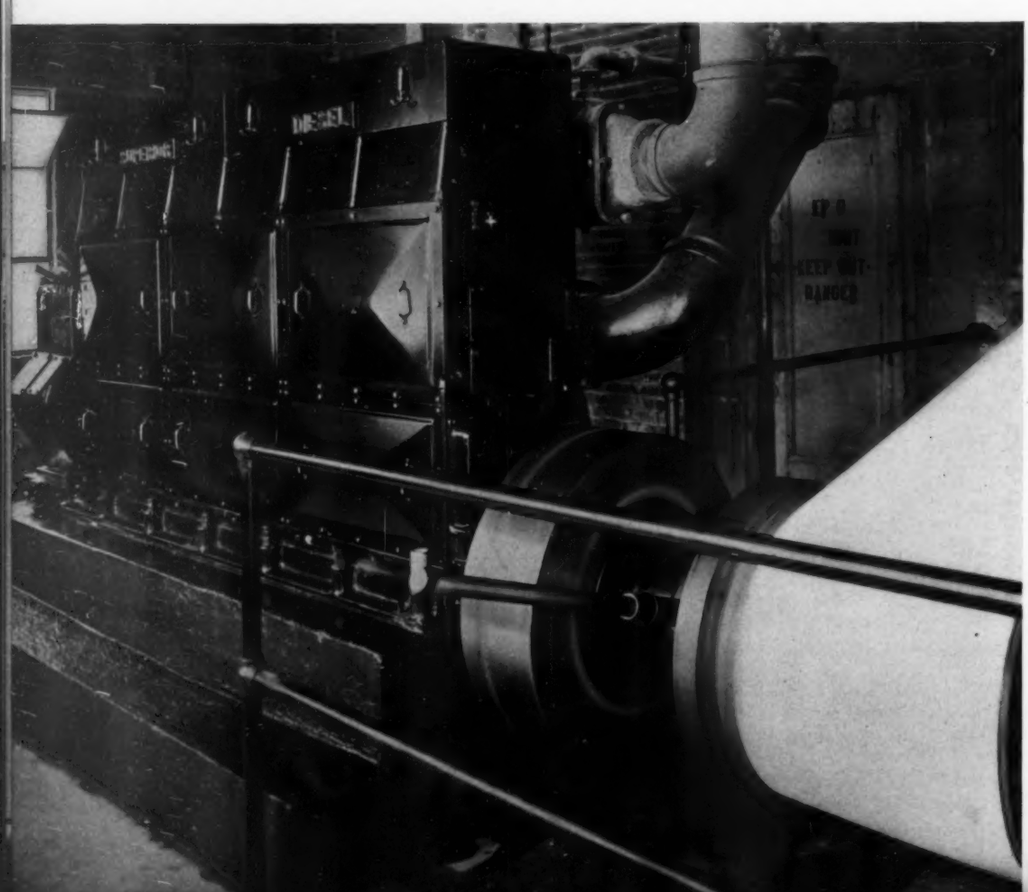
The general appearance of the plant is well shown in one of the pictures, and the space provided for the Diesel engines in the double lean-to part of the structure at the corner of the plant in the foreground should especially be observed. Originally only the smaller lean-to section at the right was provided for power plant purposes. Here was installed a two cylinder horizontal Otto Diesel engine with cylinders 13¼″ by 17″ and rated at 120 bhp. This engine was belted to the line shaft and was the sole source of power until the spring of 1936.

The plant load was far greater than the engine could handle, and as production varied with the speed of the engine, this led to frequent overloading and overspeeding, yet in spite of these handicaps and excessive maintenance the engine continued to keep the plant going.

When the purchase of a new engine was decided upon, the load was calculated to be 225 hp. at maximum production of the plant. The customer needed no persuasion to continue with a Diesel engine, and he purchased a six cylinder Superior Diesel rated at 260 bhp. at 600 rpm. maximum, with cylinders 9″ by 12″. Since the engine is belted directly to the line shafting, the production of the driven machines and the plant is controlled by the speed of the engine.

Incidentally the power calculations were confirmed after installation of the new engine in an interesting way. All driven machines were loaded to the limit to see what the engine would do. The load went up to 250 bhp., still comfortably within the capacity of the Diesel engine, when the die on the end of the auger press which forms the clay products was forced out of its position. This was partly due to dry clay and partly due to increased engine capacity, but it proved that the Diesel plant was no longer the fuse in the system.

The intake air is taken in through the Coppus air filter located as shown just above the roof over the engine. Since there is no residential section near this plant no attempt was made to silence the air intake by fitting a muffler. From the filter, the pipe leads downward and



to the lower header which runs along the back of the engine.

The exhaust outlet leads from the end of the exhaust header running along the back of the engine near the top of the cylinders, and upward to the Maxim Type BC silencer located horizontally in the upper part of the engine room, thence out through the side wall with a short vertical riser on the end. All three pictures of the plant show various portions of the air intake and exhaust systems.

Fuel oil is stored in a 5,000 gallon storage tank located above ground just outside of the engine room. It can be seen in the general view of the plant at the left of the engine rooms. This fuel is piped in to the duplex fuel filter shown attached to the end of the engine. Thence the fuel passes to the high pressure fuel injection pumps.

The lubricating oil system is self contained on the engine except for the supply tank. A double pump system is used — one pump keeps the bedplate sump dry and delivers through a filter and cooler to the supply tank, while the other pump takes the oil from the tank and delivers to all of the bearings. The engine is entirely enclosed as the pictures show.

The cooling water system starts with a small nearby pond, from which the triplex pump, driven from the end of the engine extension shaft, takes its suction and delivers the water to a 5,000 gallon storage tank on an adjacent hill. This places the tank about 20 feet above the engine room, and the water flows back by gravity to the V belt driven centrifugal pump shown in one of the pictures. Thence the water flows through the engine. A portion of it is recirculated back through the centrifugal pump in order to maintain a proper operating temperature on the cooling water in the engine jackets. The overflow returns to the pond.

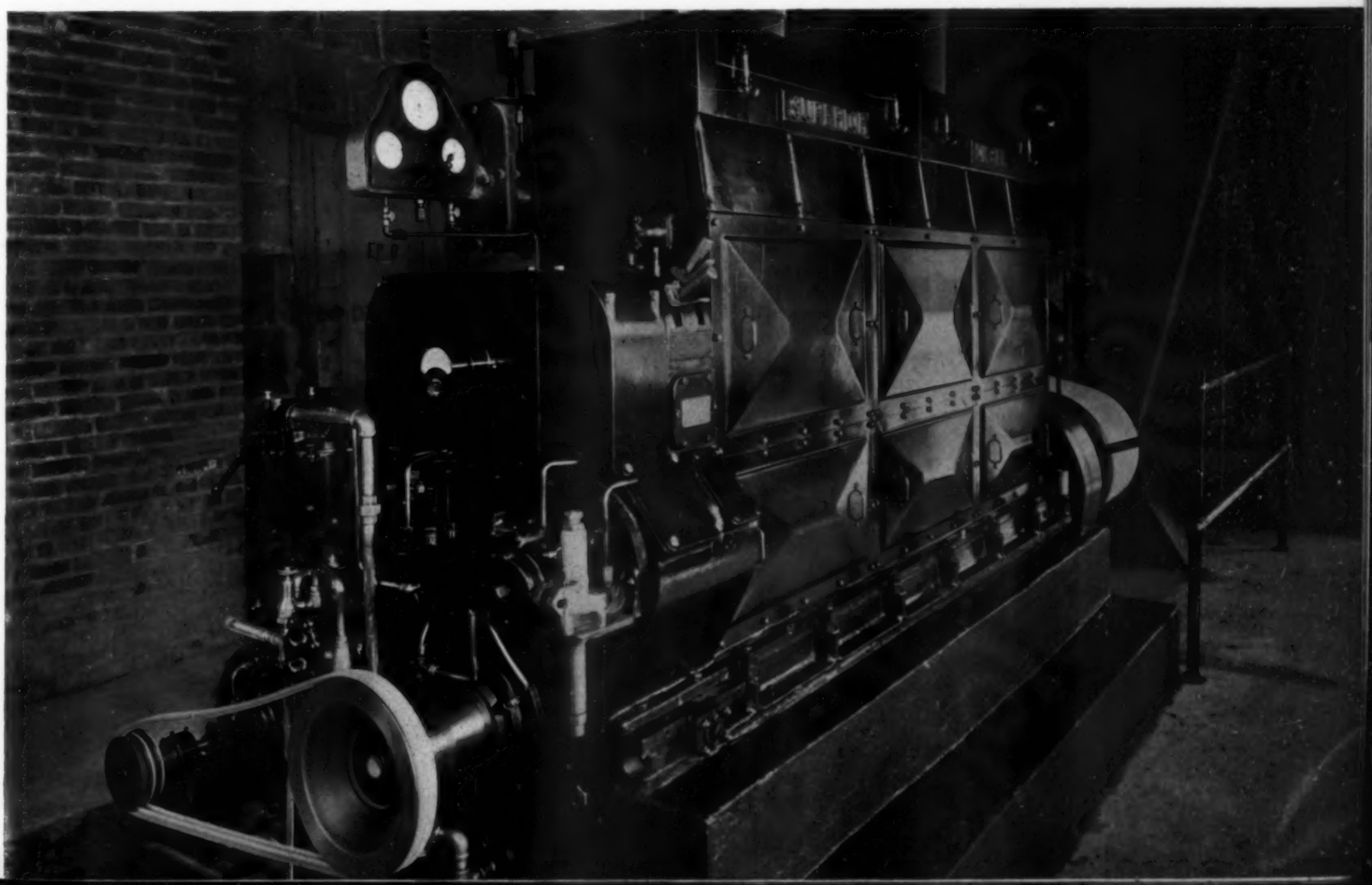
An Alnor Pyrometer for checking the exhaust temperatures for all of the cylinders is installed on the engine. It can be seen on the end of the engine casing. For further protection of the engine, there are automatic alarms for indicating a high cooling water temperature or a low lubricating oil pressure. The thermostat element for the cooling water temperature can be seen at the top of the exhaust header.

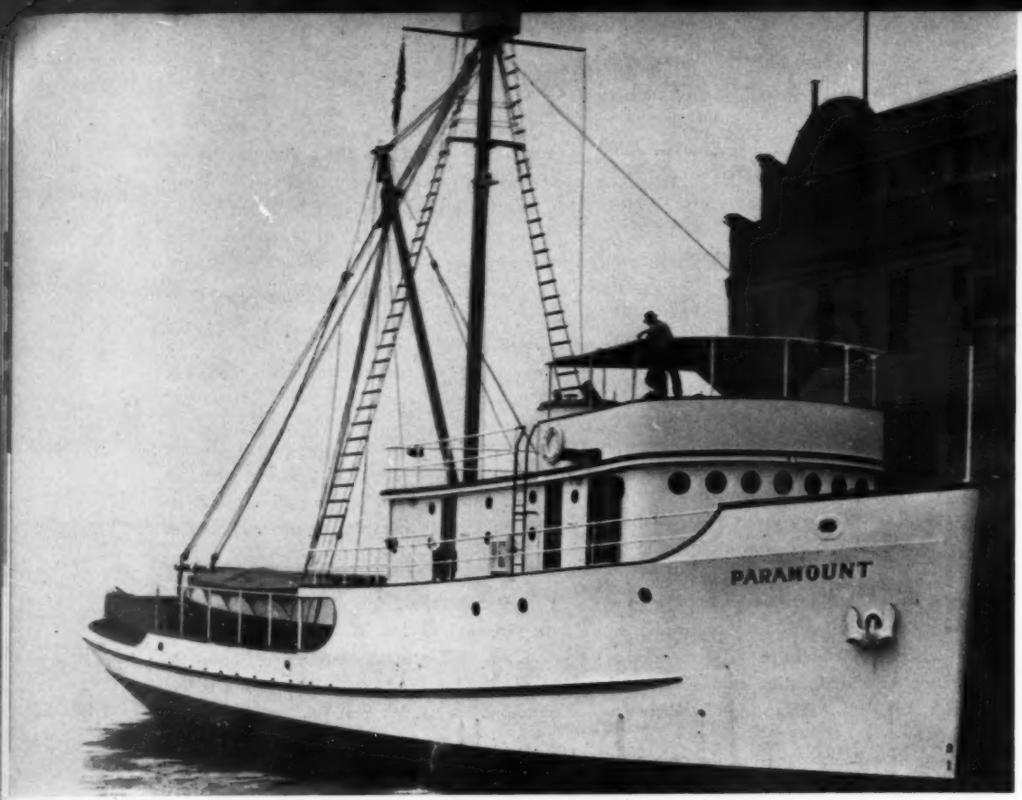
The quietness and smoothness of the operation of this plant is remarked upon by visitors, and the camera has caught some things that are not so apparent to the eye. The time exposure required for making the pictures brings out any irregularities. The smooth running of the main belt drive and of the V belt pump drive is obvious enough. The small vertical belt drive at the end of the extension shaft shows only very little side motion on the slack side. The vertical position of this drive and the size of the belt make it sensitive to that sort of thing. In addition a penny has been balanced on the top of the bedplate. It can be seen in both engine views on the front opposite the second cylinder from the flywheel end. It appears as a bright spot against the dark background. No artificial means were used to hold the penny in place, which was placed there when the plant was started in February 1936.

The normal operation of this plant calls for daytime activities only, and thus one operator suffices. Mr. Al Ruh is the engineer and he is on duty at all times during the operation of the engine.

The general supervision of the plant is under the direction of Mr. Gustav Felbeck who is treasurer and general manager of both the Montrose Clay Products Corp. and the parent company, the H. W. Bell Co.

This then is the story of how one more Diesel user successfully added to his power plant when the load outgrew the original plant, and continued the economy of power generation to which he had become accustomed. Such Diesel power plants are simply installed and their reliability raises no question in regard to hooking right up to the plant line shafting with the belt drive. Normally, this one engine operates the entire plant.





"PARAMOUNT"

ALL-WELDED DIESEL TUNA SEINER

By CHARLES F. A. MANN

ANOTHER chapter in the colorful and far flung Pacific Coast fishing industry was added when the all-electric welded Tuna seiner *Paramount* left Seattle harbor September 26th for her shakedown cruise to San Pedro, California. Not only was this vessel a revolution in ship construction, but she carried the No. 1 engine of a new, larger size series of Enterprise Diesels in her beamy engine room, and, because of her design and elaborate equipment, also heralds a drastic change in the Tuna fisheries of the middle-South Pacific.

It was a great day for this almost fabulous maritime industry when Capt. Ben Carr and Engineer Frank Mosich went into partnership with the French Sardine Company and decided to produce the first of a radically new type of Tuna clipper, and inaugurate on a large scale, the business of catching the elusive four species of fish known commercially as Tuna with purse seines instead of pole and line, with a type of seiner larger than had been built up to that time. Movie thrillers, advertising propaganda and waterfront lore have educated the American public to thinking that the only way to catch Tuna commercially was to use large fishing vessels equipped with bait tanks and a crew of husky fishermen able to swing the hook-caught fish aboard, one at a time, and into holds filled with crushed ice, for storage until the long voyage back to the cannery could be made.

But the day of pole-caught Tuna is nearing an end. Now it is a matter of rebuilding the Tuna Clipper fleet and going after whole schools of fish with 250 to 400 fathoms of net or seine, 25 to 40 fathoms wide. The *Paramount* is the first of this giant type to be built of welded steel and is first in so many respects that a simple description of her layout and equipment will at once reveal the practicability of such an elaborate and comparatively expensive fishing vessel. Heretofore a wooden ship with regular equipment, cost around $100,000. The *Paramount*, with far more elaborate equipment and welded steel hull cost over $225,000. But her capacity of 300 tons of fish, and speed and economical power and refrigeration plant, is expected to RETURN THE FULL COST OF THE VESSEL IN 24 MONTHS!

This drops the question into the field of economics. If a $225,000 vessel will return its investment in 24 months, then it is cheaper to build and operate such a vessel than to run two ships costing $100,000 apiece and capable of only returning their cost in from 5 to 7 years.

With about 150 Tuna clippers on the Pacific, it takes no imagination to foretell the construction of 75 vessels like the *Paramount* – and you can see $20,000,000 of new construction as the ultimate outcome.

The *Paramount* was built at the plant of the Lake Washington Shipyard, at Houghton, across the big lake, from Seattle. This yard will be remembered as the builder of such world-famous Diesel vessels of novel design as the *Northland, Kalakala, Chippewa, Robert Gray* and many more. Noted for their daring and initiative in handling new ship-types, the Lake Washington Yard again adds another scoop to their collection with the construction of this forerunner-type of new fishing vessel.

Again the firm of W. C. Nickum & Sons, Naval Architects and Engineers, W. C. Sr., Bill Jr. and George – did the plans and supervision. And again they worked with Lake Washington.

The new ship is 121 ft. 4 inches in length; 30 ft. beam, 14 ft. 2 inches depth; 10 ft. 6 inches draft forward, loaded and 14 ft. draft, aft, loaded, with 300 tons of fish in 8 tanks, and full load of fuel, stores and brine refrigerant. With all machinery and deckhouse placed forward, the hull is of extraordinary beam and has an almost tanker-like flare forward. The entire after hold is devoted to fish tanks with a broad deck atop, for work space. Every joint in hull and deckhouse was electrically welded. Seven portable AC-DC sets were used to "stitch" her together. All joints are butt-welded on top of frames, giving her a smooth, unbroken surface and no lapped plates exposed at any point. Keel and shear strakes are ½ inch plate; hull plating is ⅜ inch midships and 5/16 inch at each end. Framing is of 5 x 3

inch, 7/16 inch thick angle bars spaced 21 inches. Deck beams are flat bars 5½ inches wide and 7/16 inch thick. Deck plating is 3/8 inch by 24 inches. Wood grating is laid over the steel deck, the sections of which are removable for painting. The forepeak is separated from the engine space by a watertight bulkhead while the engine room and cargo tanks are separated by watertight transverse bulkheads with a vertical watertight door over the shaft alley entrance. Much cargo space is saved by the use of a 3 ft. 6 inch double bottom under the center of the ship. The double bottom is divided into four compartments with a maximum capacity of 21,000 gallons of fuel oil. No. 1 and No. 4 fish tanks are piped for oil storage for long runs to the fishing grounds, with an additional 27,000 and 21,000 gallons capacity. A grand total of 75,000 gallons of fuel oil can be carried, or enough to run entirely around the world – 24,500 miles! No fishing vessel ever built has such a large potential mileage without refueling. She carries 2,500 gallons of fresh water nominally, but can carry 10,000 gallons in the after peak tanks. The chain locker is a welded steel, watertight compartment in the middle of the forepeak ballast water tank, with a capacity of 7,500 gallons. It carries 75 fathoms of 15/16 stud link chain, made by the Seattle Chain Company. Aft of the engine room the cargo hold consists of 8 fish tanks, 14 ft. x 13 ft., extending from the bottom to the deck. This entire space is insulated with 17,500 board feet of 5½ inch cork supplied by the Cork Insulation Company of New York, through the Turtellotte Bradley Company. The cork insulation in the hold is covered with 3/16 inch welded steel plating. The outside of the ship is gloss white, further to reduce heat absorption from the tropic sun.

The rudder is streamlined, hollow welded steel. She carries a 3 bladed Lambie Propeller, cast by the Dorn Brass Foundry of Seattle, with 7 ft. diameter and 5½ ft. pitch. A lignum vitae stern bearing is fitted, as well as Kingsbury thrust bearing mounted in the engine frame. Her elaborate electric steering gear was made by the Photo Electric Pilot Company of Tacoma, which also includes the latest automatic Photo Electric Pilot steering control. Both upper and lower pilot house control is fitted, as well as duplicate main engine controls in both upper and lower control positions. The Photo Electric magnetic compass is outside mounted on the upper pilot house level, to avoid deflection by the metal hull.

Aft of the chain locker-ballast tank bulkhead, below, is the most elaborate engine and auxiliary layout found on a fishing vessel.

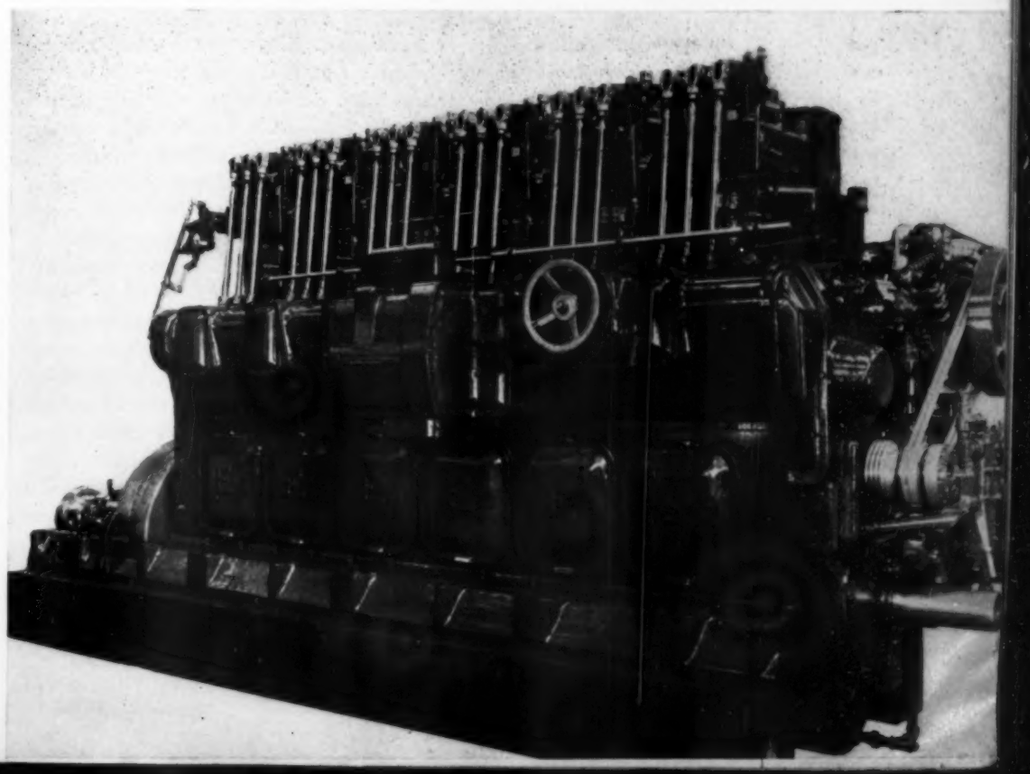
The main engine is the first engine of the new type Enterprise Diesels having six 16 x 20 inch cylinders. The engine develops 600 hp. at 260 rpm. The remarkable part of the engine seems to be that it is so conservatively rated as to output (it was estimated on the trial trip that she was developing nearly 1,000 hp.), and the engine has no critical speeds anywhere in the operating range. A thin aluminum tax token was stood up on edge on the exhaust manifold when running at half speed – and it stayed there.

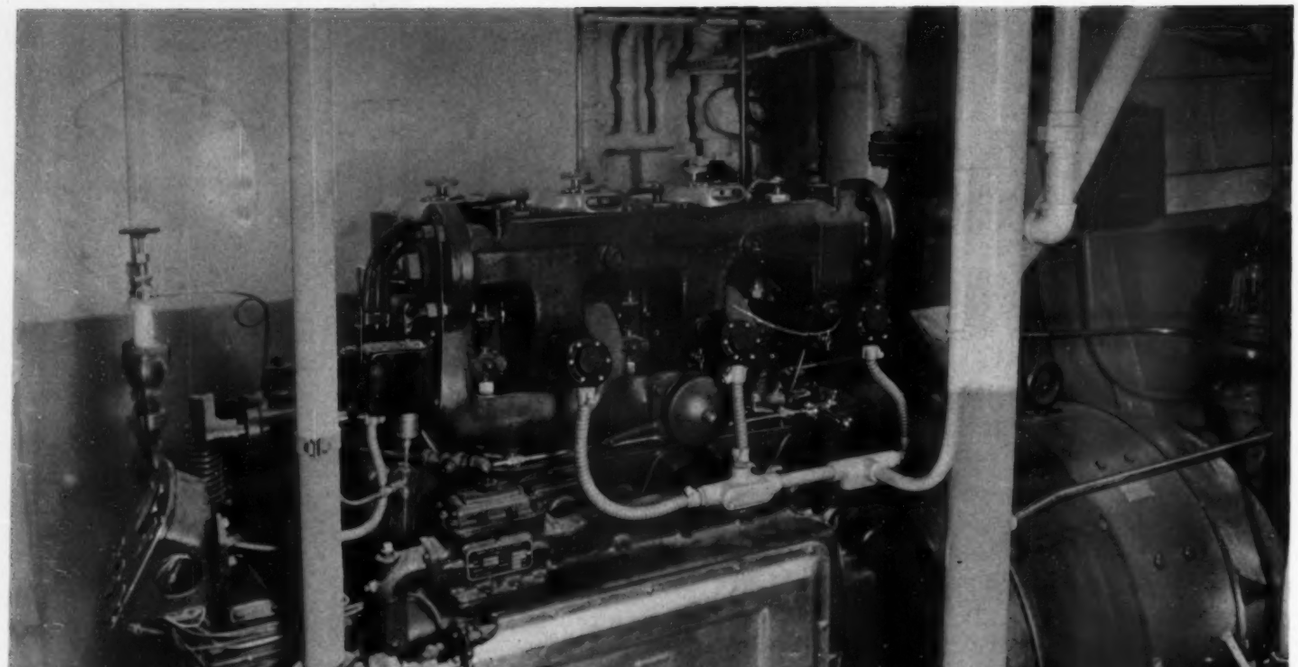
The six cylinders are cast enbloc, with the usual refinements found on thhis type of Pacific Coast trunk-piston, valve in head, direct reversing, 4-cycle Diesel. An American Bosch fuel injection system is employed, with reversing accomplished by moving the camshaft with an hydraulic ServoMotor, independently charged. A complete control panel is fitted, an unusual departure in Diesels of this type, with Brown Pyrometer indicators on each main engine cylinder exhaust and each auxiliary engine cylinder exhaust. To save space a 2-cylinder V-type Gardner Denver air compressor is multi-rope belt driven off the camshaft, as well as a 5 kw. Westinghouse generator. Beside the main engine control stand, extension controls lead to the upper and lower pilot houses, beside the steering wheel. The main engine has four Purolator oil filters, and each auxiliary Diesel has two.

It must be borne in mind that Tuna must be kept below 32 degrees from the moment it is caught until it reaches the cannery. The long hauls, sometimes up to 5,000 miles from the fishing areas, may mean that some of the fish must be kept frozen for over a month from the time it is caught. Thus the auxiliary layout calls for an unfailing refrigerating system and large electric pumping load. The auxiliary power is supplied at 115-230 volts by two identical 3-cylinder 8 x 10 inch Enterprise Diesel

Captain Benn Carr and Engineer Frank Mosich at the operating side of their new Enterprise Diesel.

Number one engine of the large size Enterprise Diesel line before installation in the "Paramount." Rating: 600 hp. at 260 rpm.





One of two 85 hp. Enterprise Diesel auxiliary sets which drive Westinghouse generators. Both engines are fitted with Harrison heat exchangers.

sets, turning a 50 kw. Westinghouse generator at about 525 rpm. The auxiliaries develop 85 hp. each. A 3 hp. emergency generating set driven by a single cylinder 3 hp. Witte Diesel is also fitted on the machinery flat above. The pumping layout consists first of two 5 x 4 inch Fairbanks-Morse centrifugal fire and bilge pumps, driven by 10 hp. Westinghouse motors. A 1½-inch Fairbanks-Morse gear pump is fitted for fuel oil transfer service. A 2-inch Fairbanks-Morse gear pump with a 3 hp. Westinghouse motor is fitted for independent lubricating oil transfer service. Two hydropneumatic sanitary pumps for fresh and salt water are fitted, as well as a deLaval No. 35 oil purifier. Two 3 x 2 inch vertical centrifugal Fairbanks-Morse brine circulating pumps, powered by 7½ hp. Westinghouse motors are fitted forward, for circulating chilled brine (seawater) from the heat exchangers to the eight fish tanks. Two vertical centrifugal Fairbanks-Morse 3 x 2 inch circulating water pumps handle sea water for the ammonia condensers, each driven by 5 hp. Westinghouse motors. The two ammonia condensers are shell and tube design, 20 inches in diameter by 12 ft., mounted on the main deck. To ammonia receivers 12 inches diameter 12 ft. long and two 24-inch x 14 ft. brine coolers are also installed on the same rack, on deck. On the forecastle deck forward of the engine room grating are two 6¼ x 6¼ inch Baker Ice Machine Co., Omaha, Neb., ammonia pumps, driven by 25 hp. Westinghouse motors. Each of these has a capacity of 21¼ tons daily. A third Baker ammonia pump — 2¾ x ¾ inch, with a 3 hp. motor, is used for ships stores refrigeration. An 8-bottle CO_2 fire fighting system supplied by the Pacific Marine Supply Co., of Seattle, is fitted with master control. Three refrigerated stores compartments are arranged on the auxiliary machinery flat. A Markey Machinery Co., Seattle, 10 hp. windlass carries both an 875 lb. anchor and a mounted below the main deck, and a 40 hp. Markey seine winch with Westinghouse motor is mounted on the deck, one forward and one aft. The latter has a constant power motor, delivering full power at any speed. The windlass carries both an 85 lb. anchor and a 375 lb. anchor, the latter having 200 fathoms of ⅞ inch steel cable on a drum. There is an A. Lietz 270 fathom sounding machine, as well as a 12-inch Sperry searchlight. The galley is large and equipped with a Buell oil burning range, built-in hot water system and a De Luxe burner. Crews' quarters for 14, including large offices for the engineer and captain, roomy locker spaces, reading lights, spring mattresses and rubber tile floor, are located on the upper deck, aft of the pilot house. Showers and lavatories are on both upper and lower decks. The entire ship can be reached from the inside passage and stairways, thus making her an easy boat to work in stormy weather. The turntable can handle 300 fathoms of large size net. The tall mast, with a crows nest lookout for spotting schools of fish, has room for "3 men and 1 pint" and the boom will handle a 5-ton load. The crows nest is 56 ft. above the main deck. The upper pilot house has a pipe frame top, for canvas covering in hot weather. Aft is carried a 24-foot power boat with a 40 hp. Buda Diesel, equipped with running lights and electric starting. This is handled by the starboard room and is set for quick lowering.

DIESEL ENGINES

By JOHN W. ANDERSON

No. 9. COOPER-BESSEMER TYPE LT

This is but one of 57 engine descriptions which appear in the DIESEL ENGINE CATALOG. *See page 143.*

THE LT is one of the latest of the Cooper-Bessemer large engine line. It is a recent development, based on previous similar designs with many years of completely satisfactory service to their credit. Of the four-cycle type, with 15½" by 22" cylinders, it is built in 4, 5, 6, 7 and 8 cylinder units, with ratings as shown on the accompanying chart. These variable speed and variable brake mean effective pressure ratings indicate that the LT meets the varying conditions of services where such engines are used. All of the units are suited for stationary and similar service at the proper ratings, and when so specified, the 6, 7 and 8 cylinder engines are made direct-reversing for marine service, directly connected to the propellers.

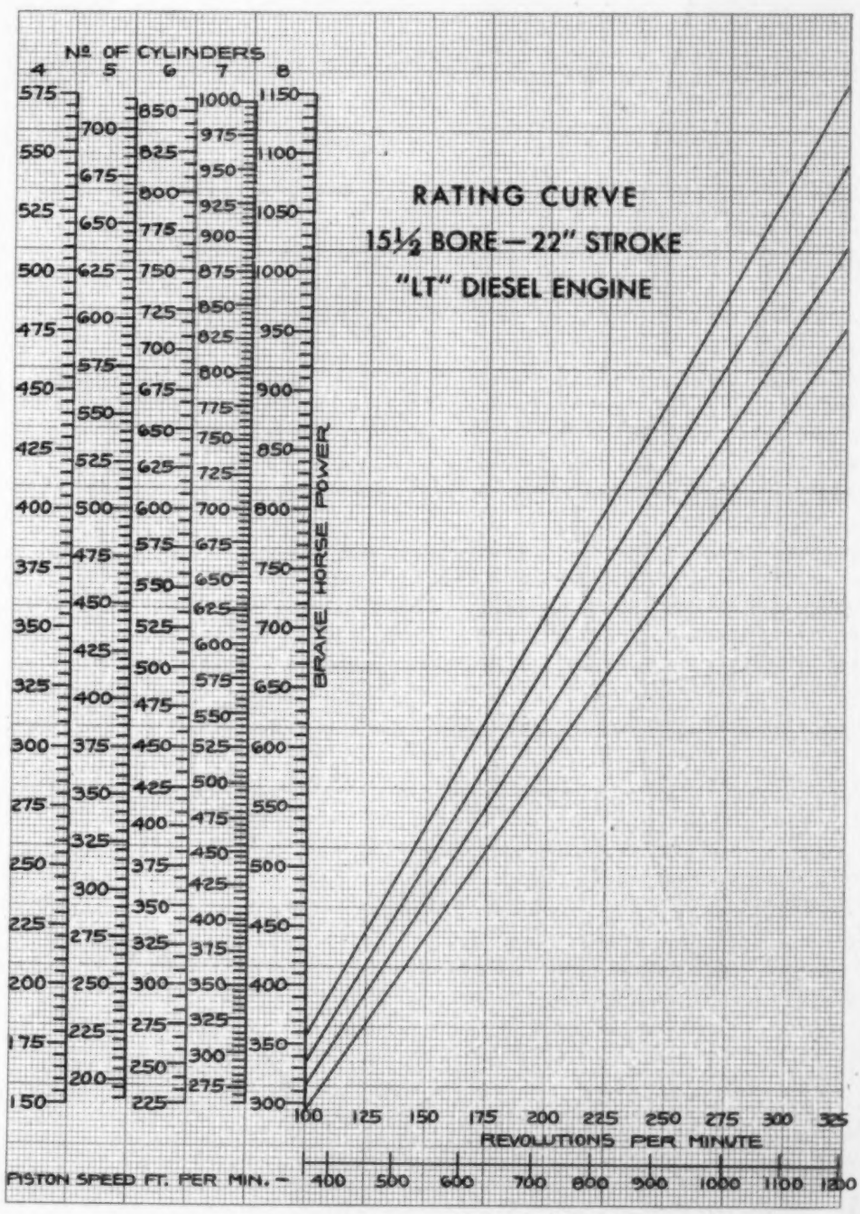
For purposes of description and illustration in this article, the six-cylinder marine engine has been chosen. The cross-section and pictures show many of the LT features of design; there are yet other features not evident in the illustrations.

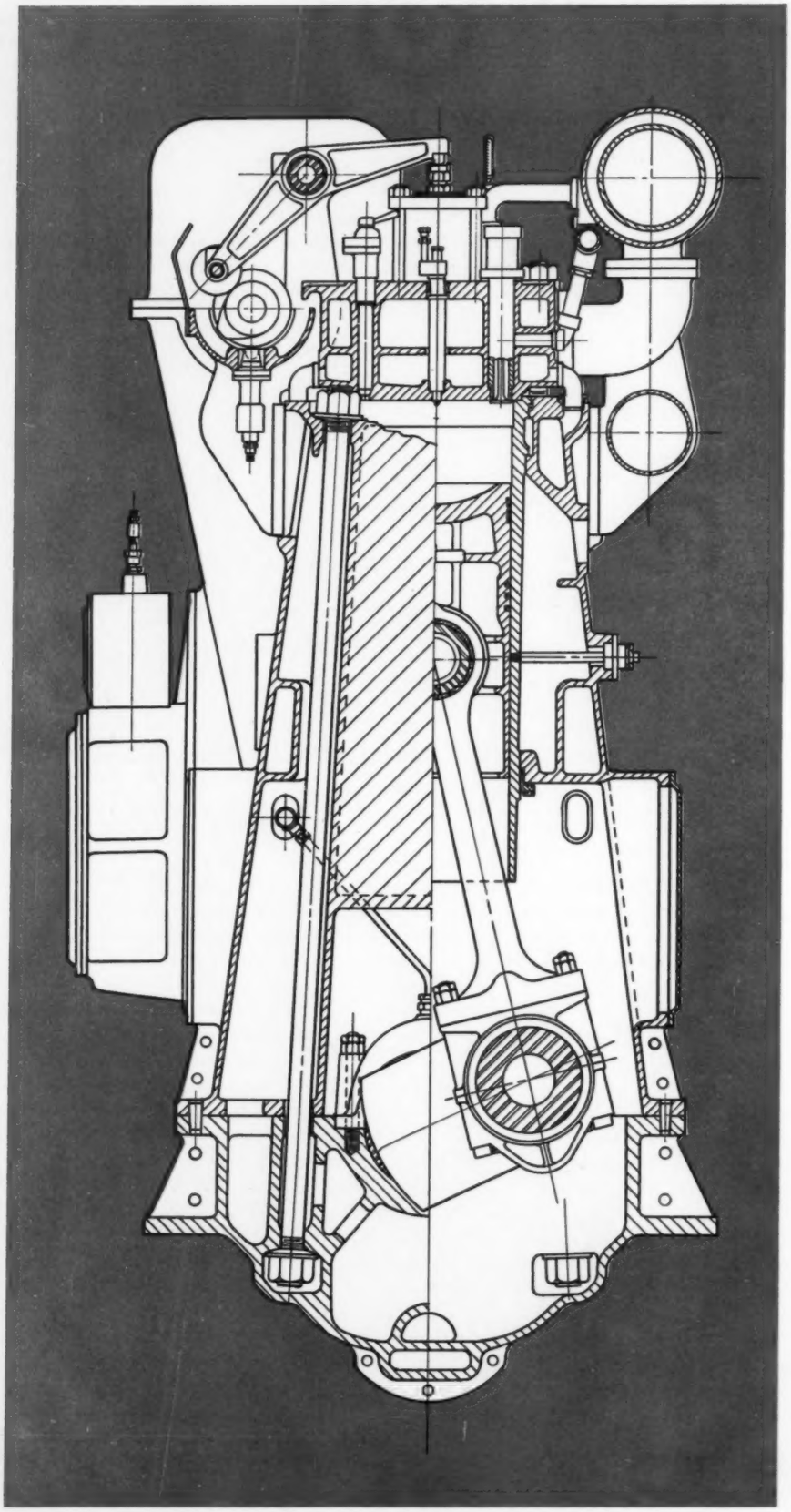
The stationary and other service types are exact counterparts of these marine engines, except for the governor and control equipment, the reversing mechanism, and the pumps.

The fuel injection system of the LT is the Cooper-Bessemer Atmospheric-Relief, common-rail type, already described in some detail in the articles pertaining to the smaller models. Cooper-Bessemer uses the common-rail injection system because they feel that it offers distinct advantages in maneuverability, and close control over a wide speed range in marine work, where so many of these engines are applied.

Pressure pumps are located on the front of the engine at mid-length, as can be seen in the illustration. A triplex pump, with an adjustable pressure regulating valve, is used and there are separate atmospheric relief timing valves and spray nozzles for each cylinder. The spray nozzles are in the centers of the cylinder heads, while the timing valves, built as individual units, are located adjacent to their respective cylinders under the camshaft trough. These valves are cam operated from the main camshaft which runs along the top of the engine at the level of the cylinder heads. The high pressure fuel headers are located along the front of the engine just below the camshaft trough brackets.

The atmospheric relief feature of the LT engine relieves pressure in the separate fuel lines to each cylinder, except during the injection period, and definitely prevents dribbling.





The combustion chamber is formed in the top of the piston and its shape can be seen in the cross section. It is the same as used in the other Cooper-Bessemer models.

Meehanite metal is used for many of the important castings of these engines. The bedplates for engines with more than four cylinders are in two pieces, carefully located relative to each other by fitted bolting and very securely bolted together. The rugged LT design achieves heavy trusses under each of the main bearings. The supporting flanges are broad and run along both sides. There is an oil trough along the bottom for draining away the lubricating oil.

The main frame bolts to the top of the bedplate, and the joint between these two comes at about the centerline of the crankshaft. The upper crankcase and the cylinder block are included in the frame casting. For the larger sizes of more than four cylinders, they include half of the cylinders in each of the two castings and there is a special casing for the camshaft-drive between these two frame castings. The frame sections are bolted together, and the bolting to the bedplate can be seen in the cross section illustration. There are dowels in the side flanges to accurately locate the frame in relation to the bedplate, and high-strength, steel through-bolts tie the bedplate and frame together to form the backbone of the engine. These through-bolts are given considerable initial tension so that the frame is constantly in compression.

Separate cylinder liners are fitted with oil-proof grommets at their upper and lower ends to seal the water joints. There is an adjustable gland at the lower end of each liner to tighten the packing. The liners are held down in place by the cylinder heads, and are supported on shoulders a few inches below the liners' top ends. The section illustration shows how the frame is webbed to provide a strong and rigid supporting shoulder, and how, at the same time, a separate chamber for water circulation is formed around the upper portion of the liner. Heavy liner sections are avoided and extra cooling is provided by this entire design.

Individual cylinder heads are used. These are bolted by studs to the top of the frame. Each head has an inlet and exhaust valve, with a fuel spray nozzle between them, in the center of the head. As the section shows, there is an air starting valve toward the back of the engine and a hand-operated relief valve at the front. Special attention has been given the

designing of the heads, to provide plenty of metal between the openings for the various valves, and to obtain a vigorous and positive circulation of cooling water to those parts subjected to higher temperatures.

Inlet, exhaust and air starting valves are mounted in removable cages. The exhaust valve cage is watercooled and the full volume of cooling water passing through the cylinder head also passes through the exhaust valve cage. Both inlet and exhaust valves have removable, heat-resisting, steel seats, and the exhaust valve itself is of chromium-alloy. All parts of the air starting system subject to corrosion from moisture, are made of rust-resisting materials. Provision is made for testing the starting valves for leakage during engine operation.

The air starting valves are opened pneumatically from timing-valves at the camshaft, and the supply of starting air to the valves in the heads comes from the header running along the back of the engine just above the tops of the cylinder heads. The inlet and exhaust valves are cam operated by the camshaft. This camshaft is carried in a trough and adequately enclosed by guard and splash plates along the front of the engine. The valve rockers and the camshaft trough are both supported by brackets secured to the front of the frame. The sectional view and illustration show the details of this assembly clearly.

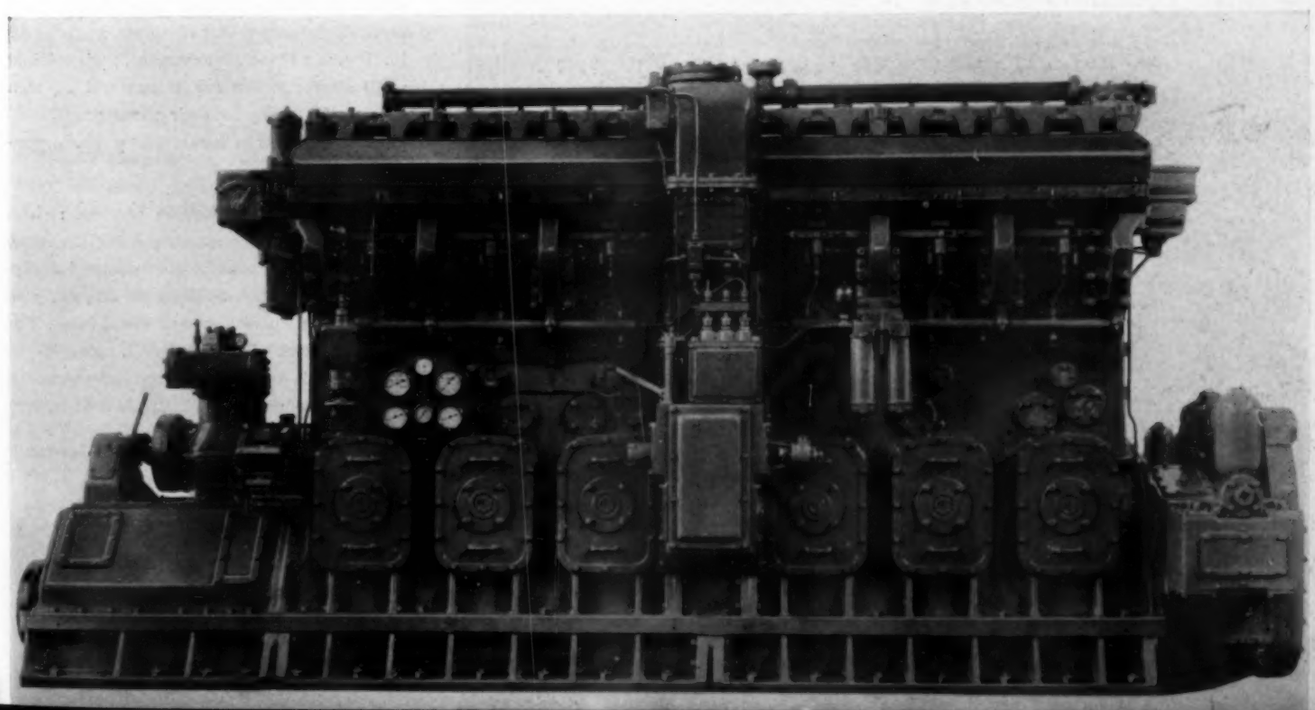
The layshaft assembly is located in the center of the engine on the larger units. This layshaft is connected to the engine crankshaft by a set of gears and drives the camshaft by means of a roller chain. A separate chain from the same layshaft also drives the high-pressure fuel and transfer pumps. In the reversible marine engines, there are two complete sets of cams on the camshaft, one for each direction of rotation. The engine is reversed by sliding the camshaft longitudinally to bring a different set of cams into action. The air-ram for accomplishing this can be seen in the front view of the engine, at the after end below the camshaft enclosure, with the buffer cylinder above. A pointer between ram and cylinder indicates clearly the position of the camshaft to the operator.

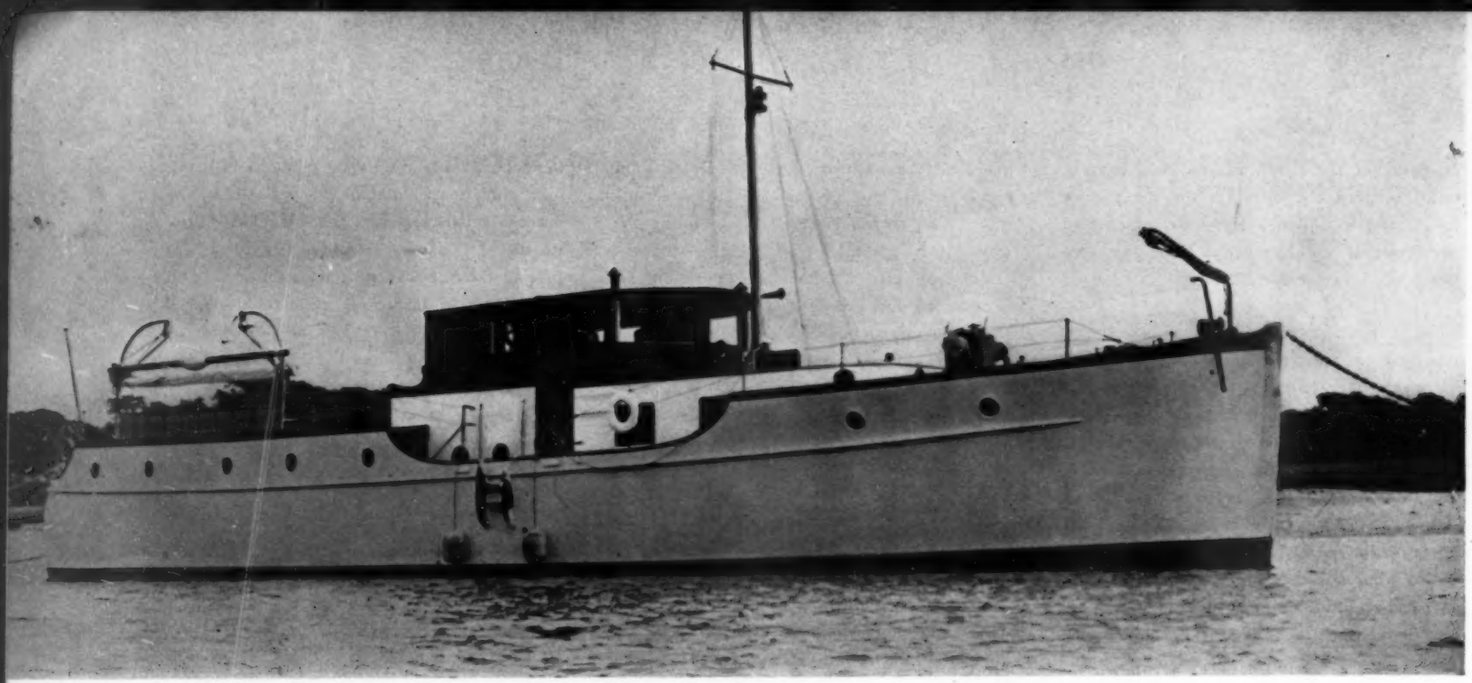
For normal service ratings, the pistons are of Meehanite. Aluminum alloy is used for the higher speeds and powers. The sectional view shows the division plate, above the wrist pin, which keeps lubricating oil off the piston crown; also the circumferential ribs for keeping the piston round. Floating-type wristpins are used, with bronze bushings in the upper ends of the connecting rods. Type LT crankpin bearings are of cast steel and lined with babbitt. Main bearing shells are steel forgings, lined with babbitt. Both main and crankpin bearings have shims for easy, precision adjustment. Note how the main bearing cap is set down into the bedplate to hold the bearing firmly in place and also provide accurate alignment. The crankshaft is a solid, one-piece forging and its diameter is about 70 per cent of the cylinder diameter. At mid-length of the engine, there is an extra main bearing of full size. Through this arrangement, a main bearing is provided on either side of the camshaft drive.

Engines are entirely enclosed except for the camshaft and valve gear on the top. Accessory equipment is conveniently, yet compactly, arranged along the sides and at the ends. Inlet and exhaust manifolds are along the back of the engine. The combining of the inlet manifold with its brackets and the brackets for the water-jacketed exhaust header are clearly illustrated. LT marine engines have a built-in propeller thrust bearing at the after end. This thrust bearing is carried in an extension of the bedplate and is covered on top, the top casing supporting a separate air compressor for supplying the starting and maneuvering air. Driven by an enclosed chain-drive from the thrust-shaft, through a friction-clutch, the compressor runs only as required.

At the forward end of the engine, in a separate assembly bolted to it, are the plunger-type water circulating, lubricating oil and bilge pumps. All are driven from the end of the crankshaft. The governor, engine controls, and gauge board are all grouped on the front of the engine at the after end. The type of governor and controls is varied to suit the requirements of the individual installation.

Cooling water circulates first through the cylinder jackets, thence to cylinder heads, exhaust valve cages, and exhaust header jacket; being finally collected in the water header to flow outboard. Notice the outside water connections between the frame and the cylinder heads, two to each head. A water-cooled compressor is used on LT engines. Lubricating oil is delivered through the distributing header, inside of the crankcase, to each of the main bearing caps, drive chains, thrust bearings, and other parts. The crankshaft and connecting rods are drilled for carrying the oil under pressure to the crankpin and wrist pin bearings. The power pistons have, in addition to their regular rings, three oil-wiper rings, located above the wrist pin, to control the lubricating oil consumption.





"Pellag II" Diesel yacht with overall length of 61 feet, an outside beam of 13½ feet and extreme draft of 4½ feet. Her engine room is shown below with its two A.E.C. 100 hp. six cylinder Diesel units.

LONDON LETTER NO. 24

By G. R. HUTCHINSON*

THE most important happening to be recorded in this month's letter is to remind readers that it is just 40 years since Dr. Diesel completed his first successful heavy-oil engine of the type which we now associate with his name. This historic occasion was marked by a luncheon and a program of suitable celebrations which the Maschinenfabriek Augsburg-Nurnberg organized at Augsburg, where, it may be recalled, Dr. Diesel's first engines were built.

The early Diesel engines were remarkably well constructed and the design was unquestionably along sound lines. Several of these early units, including those built by M.A.N., Krupp, Mirrlees, Bickerton & Day and other concerns have had particularly long lives and so far as the British firm, at any rate, is concerned, their original small single-cylinder engine can still be seen running faultlessly in their works near Stockport, Cheshire. The fuel consumption, in passing, remains good.

Reference has been made in previous articles to the A.E.C. high-speed marine Diesel engine, which is manufactured by the Associated Equipment Company, of Southall, Middlesex, who are the suppliers of London's Diesel buses. The vessel illustrated is the *Pellag II*, belonging to Major J. M. Hoult, who previously owned a petrol-driven boat. The *Pellag II* is 61 ft. long

*Editor of "Gas and Oil Power" and Managing Director of the Whitehall Technical Press, Ltd.

by 13 ft. 6 in. broad, and has a draught of 4 ft. 6 in.

Propulsion is by two six-cylinder 100 bhp. air-cell-type heavy-oil engines which are shown installed in the vessel's engine room. These transmit their power through 3 to 1 reduction and reverse gearboxes, and at 1,450 engine rpm. a speed of about 9 knots is obtainable. As the owner is exceptionally tall, the headroom is greater than usual. Two double staterooms are provided, one of which can be divided into two single cabins, while the bathroom can also be converted into a single berth cabin should the need arise. The boat is so arranged that in an emergency she can be handled by one man.

Major Hoult has favorably commented upon the operation of this boat after she made a fairly long and successful maiden voyage. The consumption of fuel at 9 knots, he stated, "appears ridiculously low after having had a petrol-driven boat. Our tanks, holding 400 gallons, had supplied us for some 20 hours' running before we started and contained more than ample to take us round to Southampton. In fact, I shall not need another fill before the end of the season."

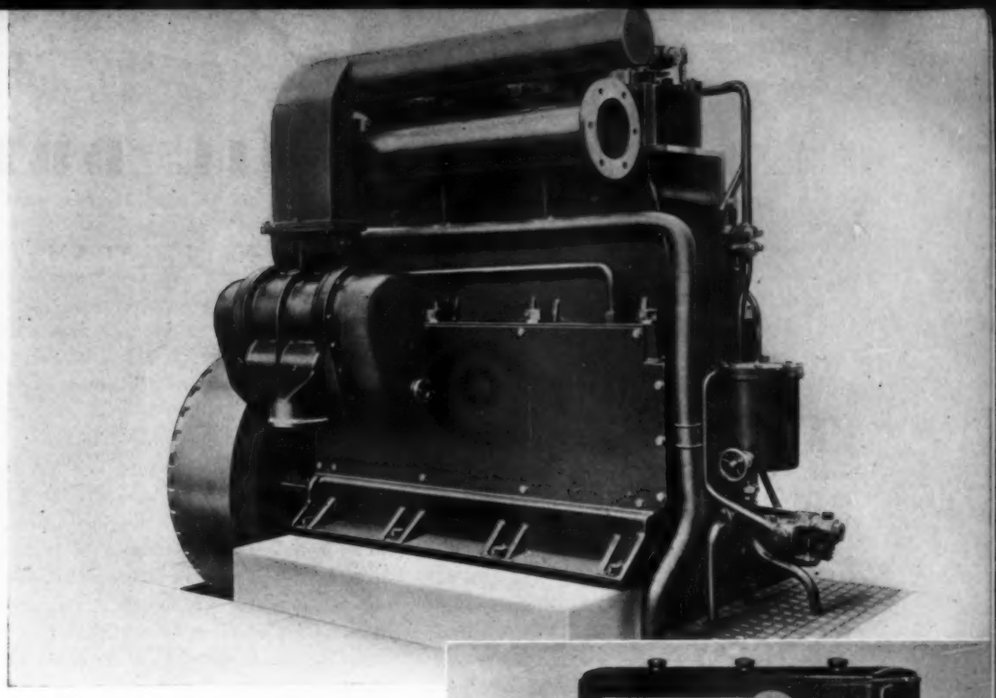
A new range of medium-power, medium-speed vertical Diesel engines has recently been introduced by the Swiss Locomotive and Machine Works, of Winterthur, Switzerland. These engines are available with two, three, four, five, six, and eight cylinders, and develop a normal power of 50 bhp. per cylinder at 600 rpm., with a moderate piston speed and mean effective pressure.

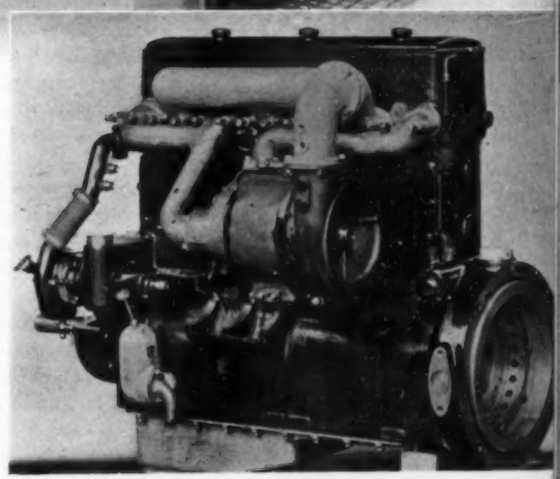
An interesting feature of the range is that provision is made in the design for supercharging. Suitable facings are provided on the crankcase for attaching an engine-driven blower of the Roots type, which allows of the power of the two-cylinder engine being increased from 100 to 140 bhp., and so on up to the two largest engines, which may be fitted with the Büchi system of turbo-charging instead of the mechanically driven blower.

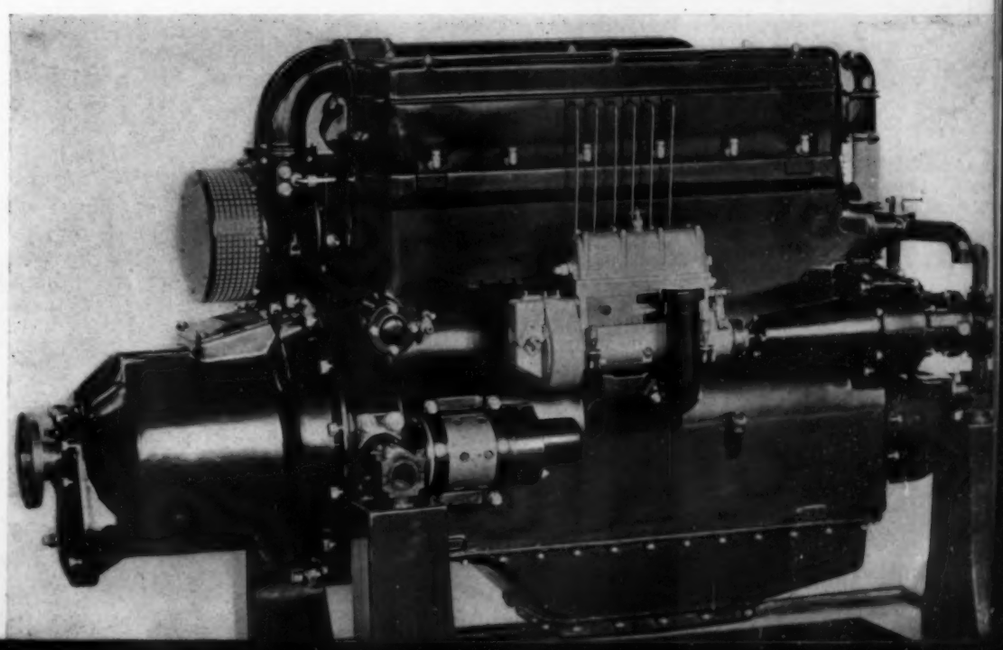
With the Büchi system the six-cylinder engine output is raised from 300 to 480 bhp. and the eight-cylinder set from 400 to 640 bhp. Furthermore, with the Büchi system the specific fuel consumption is reduced somewhat, whereas with the mechanically driven supercharging blower a slightly increased specific consumption is naturally entailed when the engine has to drive its own blower.

The general appearance of these units is neat and clean, an interesting feature of the design being the provision of easily detachable members at the front of the frame, which on removal allow of the crankshaft being withdrawn sideways. These detachable columns or frames are in the form of turned steel bolts or pillars.

Another interesting Diesel pumping station which has recently been completed is that of the East Surrey Water Co. at Purley, near London, where two Allen engines have recently replaced some venerable beam steam engines. Each of the pair of standard Allen six-cylinder engines develops 544 bhp. at 345 rpm., and the plant is interesting in that each engine drives a direct-current generator and a vertical force pump through bevel gearing. The generators supply power for two motor-driven bore-hole pumps, two force pumps, and the necessary current for lighting and heating the establishment. Each generator is rated at 155 kw. at 230 volts and it is interesting that engines, generators, driving motors, and the various pumps are all of Allen manufacture.







(top) New Swiss Locomotive four cylinder Diesel with built-in turbocharging blower. (center) Six cylinder Saurer Diesel engine, 110 mm bore, 150 mm stroke, rated at 95 hp. at 1800 r.p.m. Buchi turbocharging gives a rating of 140 hp. at the same speed. (below) Six cylinder Saurer Diesel with 130 mm bore and 180 mm stroke, rated 150 hp. at 1500 r.p.m. Buchi turbocharging gives a rating of 225 hp. at the same speed.

DIESEL OIL DRILLING

By ORVILLE ADAMS

THE great Permian Basin in West Texas, comprising 67 fields and pools spread over 19 counties of West Texas, and including part of New Mexico, where approximately 6,000 oil-wells have been brought into production in the last few years, is the scene of the greatest Diesel activity in the entire petroleum industry. Scores of Diesel drilling rigs are found in this region, operating 24 hours a day, year in and year out, while hardly a day passes without seeing a new Diesel rig coming in, one company having placed practically 100 engines in drilling service the last year and a half.

It is nothing unusual to find drilling contractors with four to ten drilling engines operating in this area, where some very interesting records have been made for Diesel drilling. One contractor reports finishing 15 wells with his first Diesel rig without the loss of as much as one hour in time on account of the Diesel engines, with a total footage approximately 50,000 and over a year's time when the rig operated continuously. Another contractor drilled 20 wells without overhauling his engines on his first rig, with a total of 80,000 feet credited to this rig with very little maintenance and repair cost. As compared with other types of drive the fuel cost is a very surprising revelation.

Diesel engines in the drilling service range in horsepower and weight from the light, high speed units of the experimental type to the medium speed, established designs. Regardless of the type of engine, almost all the Diesel engines now being used in drilling service are readily adapted to transportation by truck. These power units can be loaded on trucks completely assembled, and usually do not require any dismantling for moving to location. Very frequently the engines and auxiliaries can be delivered at the well location in one truck. A similar capacity steam ring rig would require several truck loads.

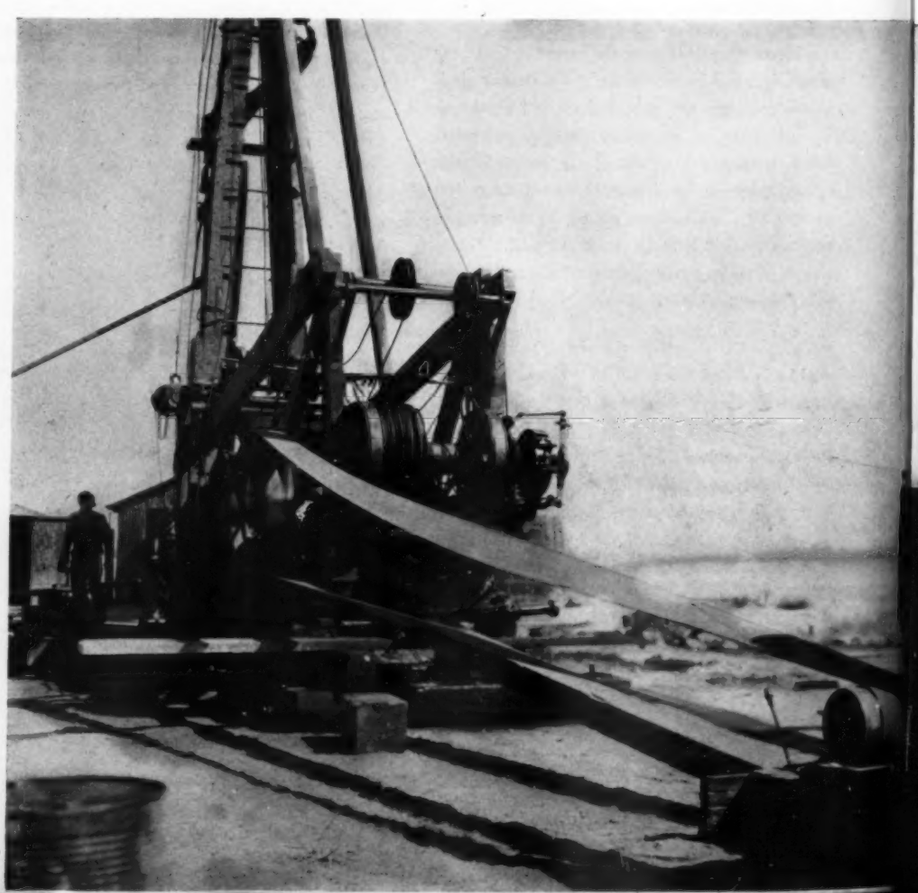
Contractors who own and operate both steam and Diesel units in this area are emphatic in stressing their preference for Diesel rigs, pointing out that they prefer the Diesel to steam, even if there were sufficient water and fuel available for steam operation. The savings in time in moving and rigging up is a very considerable item; moreover, there are other advantages now regarded as belonging exclusively to the Diesel rig which influence this tendency to replace steam with Diesel rigs, a movement that is going over very rapidly at the present time. These operators likewise claim that the steam rig cannot make any better time on the drilling of the well than the Diesel.

In a recent interview with Mr. Winston F. Taylor, of Mitchell and Sullivan, Drilling Contractors, Fort Worth, Texas, a number of very important points and facts were brought out in the discussion of Diesel versus steam in drilling oil wells. These contractors own and operate three steam rigs and two Cummins Diesel mechanical rigs. At the present time they are converting their steam rigs to Diesel drive as rapidly as possible.

The experience these contractors have accumulated the last couple of years has convinced them that they would rather have Diesel rigs than steam rigs for drilling on locations anywhere, regardless of conditions.

On the day of the interview, Mr. Taylor mentioned that they had just purchased another Diesel outfit to convert one of the steam rigs to Diesel drive. The advantages of the Diesel rig over the steam rig, he says, for drilling in the northern Permian Basin fields, where his firm operates, might be classed as flexibility, as much as the savings in fuel cost. These facts he had at his finger tips and showed on the basis of experience that Diesel rigs are practically the only profitable rig, and evidence that this type of power excels any other power for this area.

As an example, Mr. Taylor detailed the records of their first Diesel rig, with two 200 hp. Cummins Diesel engines. The first well drilled with this rig, 5,000 ft. deep, was put down with a net drilling time of 19 days, during which time they set 4,985 ft. of 7 in. casing, cutting an 8¾ in. hole. They had never made such a record with steam for time on the location. Drilling two more wells immediately following this,



they were able to make the same good showing for time, also finding that the Diesel engines handled the rig in a manner similar to steam for available power, torque and acceleration.

With the Diesel engine, there is eliminated entirely the numerous disadvantages encountered in this area when using steam engines. The fuel available in this area for boiler fuel as well as the usual water to be had ruins the boiler flues or tubes in a short time, and they have to be replaced too frequently. Instead of drilling two water wells for a location, which is required when using steam, only one well is necessary for the Diesel rig, thus saving the cost of digging the one well, which amounts to around $200, as well as the extra power for pumping. As enumerated by Mr. Taylor, the savings to be added up in favor of the Diesel rig are summarized.

1. Savings in Rigging Up Time. This amounts to at least two days, which saves about $240 in wages for the drilling crew. The Diesel rig is mounted on the location with a minimum of time and preparation for actual drilling.

2. Savings in Moving Time. This is equivalent to another $250 which is made when the rig is moved from one location to another. Steam engines, boilers and equipment cost much more to move than the Diesel plant, in addition to dismantling expense.

3. Where natural gas for firing the boilers is available, this costs from $10 a day and up for each boiler, and since there are usually three boilers for each rig, this amounts to a total cost for fuel of $30 a day for gas alone for steam operation.

4. Operating cost per day for the Diesel engine rig based upon a fuel consumption of approximately 200 gallons per day for two engines of 200 hp. capacity at 6 cents per gallon amounts to $12 per day, with lubricating oil costing no more than $4 per day, making a total of $16 a day as against $30 for steam, without allowing anything for water in the event this has to be purchased.

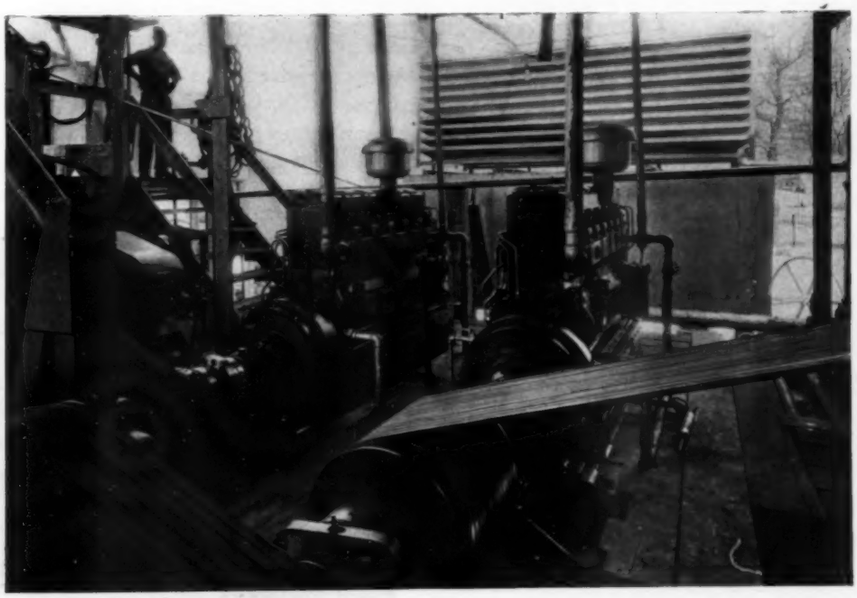
5. The situation for steam, Mr. Taylor says, is even more discouraging when the crude oil available in this region is used under the boilers, with its high sulfur content that ruins the boiler tubes in a short time. To drill a 5,000 ft. well in this region with boilers burning crude oil will require at least 4,000 barrels of oil at $.80 to $1 a barrel, or nearly a barrel of oil per foot of depth, which sometimes runs more than a barrel of oil per foot.

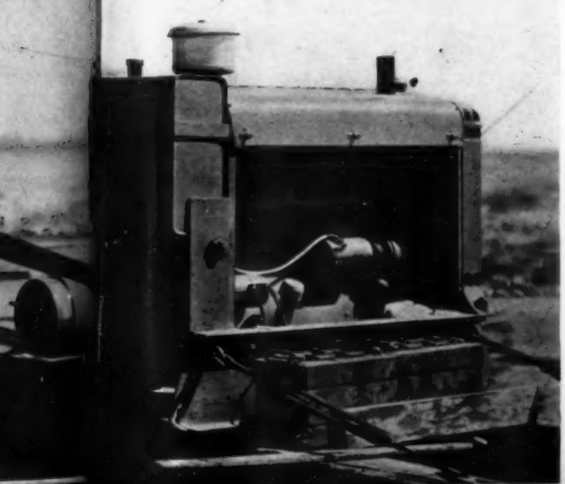
On the other hand, he states, that the Diesels will drill a foot of depth for approximately one gallon of fuel costing 6 cents per gallon, as against practically $.80 to $1.00 per foot with steam. For obvious reasons, steam on a drilling rig must necessarily be very inefficient under operating conditions prevailing in the oil well drilling work. It is practically impossible to avoid this great waste and inefficiency, as the setting of the boilers, the long steam lines, etc., must cause condensate in the lines, which results in irregular and unsatisfactory operation at times of the steam engine and pumps. In telling about his company's experience on some of the New Mexico locations, he finds still another great advantage enjoyed by the contractor with a Diesel powered rig. In that section water is scarce and must be purchased from a water company whose charge for every well is $2,000 in case of steam drilling and $1,000 for Diesel rigs, an amount that is way out of line, for the Diesel requires practically no water, and the amount needed for the slush pump is nothing like half that required for steam engines and pumps. Having drilled in these locations with both steam and Diesel powered rigs, Mr. Taylor has found that steam drilling is now passing out on account of the cost, and Diesels are far better adapted to this service.

The experience of this contractor with both the steam and the Diesel drilling rig on 25 wells when summed up shows a wide difference in cost, time saved and speed of production. A Diesel rig saves at least $1,000 over steam before the drilling starts, and after the drilling is under way, the savings in fuel and oil cost amounts to 50 per cent or better on fuel against natural gas, and about ten to one in favor of the Diesel engine when compared to burning crude oil under the boilers, as well as a great savings on water.

Having found that the Diesel of today, as used in this service, equals steam flexibility, torque and pickup, as well as reliability, and has none of the disadvantages of steam in other respects, is it any wonder that the contractors are going over to Diesels as fast as these engines can be delivered?

The writer finds that Mr. Taylor's experience and his firm's record is not an isolated condition occurring alone in this vast area of oil well development, but is typical of the greater number of contractors with similar experience in this area.





Above: The Noble Drilling Company's No. 2 A.C. Cummins Diesel Rig drilling for the Carter Oil Company near Wilson, Oklahoma. Left: Cummins Diesel on cable tool drilling.

FIFTY-SEVEN DIESEL ENGINES

Described in Detail by JOHN W. ANDERSON
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Coatalen—Aviation
Cooper-Bessemer—four types
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Fifty-seven different models described and illustrated in color and full section.

THIS new book on Diesel engines is entirely different from any other book previously published on the subject. In this new book fifty-seven Diesel engines are described in detail, illustrated in color and in full section.

John W. Anderson, author of the well-known book "Diesel Engines;" editor of "Diesel Application Planbook, Vol. One" and contributing editor to DIESEL PROGRESS, one of the most experienced and best known engineers in the Diesel industry, has described in intimate detail these fifty-seven Diesel engines. In this book he goes into the matter of individual design, discusses the features of design of each engine in clear cut, thoroughly understandable manner and makes it possible for the reader to grasp readily and quickly the differences between the various makes and types of engines now available on the market. He makes it possible to select from these fifty-seven different models the one engine fitted to the job in mind.

Beautifully illustrated in color, with sectional drawings vizualizing with complete clarity the design features of each engine, this new book brings you under one cover a marvellously clear picture of the engines now available. Right up to the minute, as modern as tomorrow, printed on a big page size (10¼" x 13½") to make the illustrations readable, this new book is indispensable to the Consulting Engineer, Diesel Salesman, prospective Diesel engine buyer—yet the price is but $3.00 postpaid.

In addition to the section of this new book devoted to engine descriptions, nearly 150 pages of additional material of vital interest to you will be found immediately following the engine articles — see chapter headings hereunder. Your particular attention is drawn to the "Birth of the Diesel Engine" chapter because here you will find how the Diesel engine started, who was Dr. Diesel, what happened to him —original data never previously published on his early trials and tribulations—an intensely interesting chapter.

The blueprint section of the book, following the style set by volume one of the DIESEL APPLICATION PLANBOOK last year, will be found worth the price of the book. Eighty odd pages of new plans, new applications, bringing you up-to-date with what has happened during the past year in applying Diesel engines to varying power problems.

We offer you this new book believing it to be the finest book of its type ever produced, authoritative, informative, beautifully printed and bound—a book you will be proud to own, a book from which you will obtain much useful information. May we hope you will use the coupon hereunder to-day—now.

ADDITIONAL CHAPTER HEADINGS

(1) The Birth of the Diesel Engine
(2) Vibration Elimination
(3) Noise Elimination
(4) Flexible Connections
(5) Air Filtration
(6) Ponca City, Okla.
(7) Department Store Application Study
(8) Port Clinton, Ohio
(9) Sailors Snug Harbor
(10) Chicago Diesel Fire Boat
(11) 580 Fifth Ave., New York
(12) Mobile Ice Plant
(13) New York University
(14) Parke Davis Company
(15) Imperial Irrigation District
(16) LaPorte City, Iowa
(17) 8000 kw. Shanghai Plant
(18) 15,000 kw. Hydro Standby plant
(19) 22,000 hp. Mine installation
(20) Combination Hydro-Diesel-Steam
(21) French Community installation
(22) Paris, Texas, Observatory
(23) Langbein Cutlery Company
(24) U.S. Coast Guard vessel

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Enter my order for a copy of the DIESEL PLANBOOK & ENGINE CATALOG, Volume Two, for which I enclose $3.00—it being understood that shipment will be made postage prepaid.

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TWO NEW APPLICATIONS OF INDUCTION HEATING

TWO new applications of induction heating are now being installed by the Ajax Electrothermic Corp. The principal applications of this type of heating up to this time include electric melting in the Ajax Northrup high-frequency furnace, continuous heating of thin strip steel and tubes, drying or baking enamel on metal parts and the hardening of metal surfaces by quenching after induction heating as in the "Tocco" process of The Ohio Crankshaft Co.

The new applications referred to include:

1. Induction heating of tube ends prior to a series of forging operations.
2. Heating an end section of a large steel tube prior to a swaging operation.

An example of the first of these new applications, is an individual heater control panel and the coil of the induction heating apparatus with two steel tubes inserted. High frequency power at 2000 cycles is applied to the coil and, in less than 1 min., 6 in. of the end sections of the two steel pipes are heated to 2200 deg. F. after which they are forged.

There is also a special focus induction coil with a narrow band at the end of a tube heated to 2200 deg. F. This is a subsequent operation to that described in the preceding paragraph. Fig. 1 shows a cross section of the focus one turn coil, the tube end, and indicates the sharply defined heating zone.

The Ajax Electrothermic Corp. states that, in connection with this device, the same fundamental type focus inductor coil is used as in Tocco process for hardening crankshaft bearings, mentioned in the opening paragraph. This process was developed at Trenton and its refinements and automatic operation have been and are carried on by the Trenton company's sole licensee for the process applied to crankshafts and camshafts—The Ohio Crankshaft Co.

The difference in the two applications is that, for surface hardening, a large amount of power is concentrated for a few seconds so that the heating is entirely confined to the surface of the crankshaft bearing after which it is rapidly quenched to produce a very hard surface with a tough core. In the application for heating a tube end, Fig. 1, the power is not kept at such a high value; the time is extended to nearly a minute and the walls of the end of the tube are uniform in temperature at 2200 deg. F.

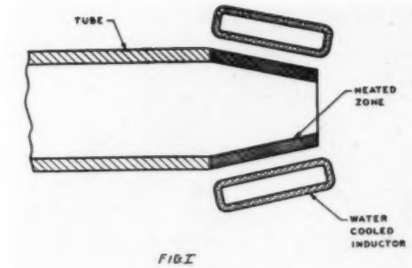


FIG I

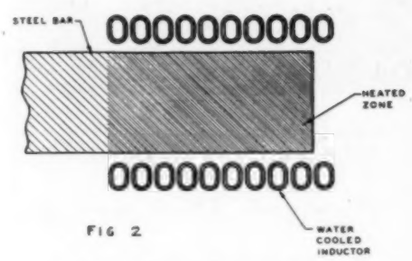


FIG 2

Fig 1. Cross section of the focus one turn coil showing heated zone.

Fig. 2. Cross section showing uniform heating of an end of a bar or billet.

In Fig. 2 is shown the uniform heating of an end of a bar or billet, using this time a straight coil energized with high frequency current. It is pointed out as of interest that it is possible to heat uniformly the section of a 3-in. diameter billet to 2200 deg. F. in 2 min. A 7-in. square billet, tested in the Ajax plant, came uniformly throughout the section to 2200 deg. F. in 15 min. Temperatures were checked at the surface and at the center with thermocouples. To heat steel to a forging temperature requires about 400 kw.-hr. per ton overall.

OHIO CRANKSHAFT COMPANY DOUBLES PLANT CAPACITY

CLEVELAND, Ohio—W. C. Dunn, President of the Ohio Crankshaft Company, announces that construction is well under way on the company's new plant located at the corner of East 42nd Street and Harvard Avenue, Cleveland.

The new plant, located approximately one mile from the present plant on Clement Avenue, will provide 75,000 square feet of floor space in a building 500 ft. x 150 ft. on an 18-acre site. This acreage provides room for three additional units similar to the one under construction. The cost of the land and building totals $300,000. New equipment to be installed will cost an additional $400,000.

Included in the new plant is a $100,000 laboratory for research in the Tocco Process.

OLIVER F. ALLEN

Engineer Oliver F. Allen has severed his connection with the Public Works Administration in New York to permit him to devote more time to his active and increasing Consulting Engineering practice, especially in reference to Diesel engines, power plants and international engineering and production liaison.

He continues as Managing Director of Martin Motors, Inc. and Secretary and Director of American Rezo, Inc.

SAE NEWS

DIESEL engines will now benefit directly from the work of the Cooperative Fuel Research Committee, for the formation of a C.F.R. Automotive Diesel Fuels Section was authorized at a recent meeting of the Committee, thereby approving the application of the Volunteer Group for Compression-Ignition Research, an SAE project. The SAE is one of the four organizations whose members make up the Cooperative Fuel Research Committee, a continuing research project which serves as a connecting link between the automotive and petroleum industries.

As predicted, Diesel engines figured heavily in the discussions at the SAE National Regional Fuels and Lubricants Meeting at Tulsa, Oklahoma, September 30 and October 1. Pro-Dieselites won the unanimous decision of the judges in the debate against the other college team, upholding the gasoline engine, and three Diesel papers stirred spirited discussion.

C. L. Cummins opened the meeting with an informal discussion of the developments in Diesel engines that were necessary to adapt them to rough oil-country usage, such as drilling and pumping.

"Although a sufficiently good Diesel fuel is necessary to eliminate roughness and knock, the use of a still better fuel does not improve efficiency or give greater power," pointed out Robert Best in the second Diesel paper of the SAE F. & L. Meeting at Tulsa, in which he brought to the attention of Diesel operators the properties of Diesel fuels known to be significant. To secure the high mean effective pressures necessary if the Diesel engine is to compete successfully with the carburetor engine, he added, means just one thing—the complete combustion of all the oxygen taken into the cylinders.

That the trend in SAE Diesel papers seems to be away from the technical toward the practical and economic, especially in comparisons with gasoline engines, is evidenced by past and future SAE Meetings programs. In the final Diesel paper of the Tulsa meeting, A. F. Campbell resolved the issue as follows: "After forty years of concentrated effort in its development, the modern gasoline engine has set up standards of quietness, smoothness, reliability, easy starting, high performance, high output per pound, reasonably acceptable economy, and universal service. If the Diesel engine is to succeed in the ultimate retirement of the gasoline engine, it must equal or better every one of these standards."

WRITE FOR IT

ONCE in a long, long time a booklet comes over our desk which is outstanding enough to make us stop, look and listen. "Diesel Engines and their Lubrication" is that kind of a booklet and every reader of DIESEL PROGRESS should write for a copy.

It is absolutely free from propaganda, absolutely free from superlatives, from exaggerated claims or the ordinary type of sales promotion.

In this booklet you will find a re-statement of what a Diesel engine is, how it works, why it accomplishes what it does — graphically and simply told. Plus a number of graphs showing where Diesel engines are used, what industries they are used in, annual production figures, etc.

The different types of Diesel engines are described in a thoroughly understandable manner with excellent illustrations. All in all this booklet is a text book we should all have on file.

Whilst the limited supply lasts, a copy will be gladly sent you if you will mail your request to Mr. J. E. Jury, Shell Petroleum Corp., Shell Bldg., St. Louis, Mo., mentioning your business connection.

TAMS, INC.

AN announcement of more than unusual interest has to do with one of the oldest firms of yacht brokers and naval architects in this country, Tams Incorporated, with New York offices at 250 Park Avenue.

Tams Incorporated is a successor corporation to the famous Tams, Lemoine and Crane, dating back to 1895, when the late J. Frederic Tams instituted that business.

In later years some of the more famous Diesel powered yachts included the 160 ft. *Thalia*, the 154 ft. *Avalanche*, the 148 ft. *Alamo*, the 130 ft. *Centaur*, and the 70 ft. *Clumber*, all of which have enjoyed enviable distinction.

Having in mind the further development of the yacht designing, brokerage, and insurance business, Edgar Offer, president of the firm, announces several important additions which have been made to the Tams Staff: A. G. Griese, who for the past twenty-two years was Eastern Manager of the Winton Engine Corporation, comes to the firm as vice-president, while Richard B. Cook, well-known Naval Architect with a broad training and experience in both designing and building of all types of yachts, assists Mr. A. W. Crouch in the technical department.

LARGE DIESEL EXPORT ORDER

THE United States of Soviet Republics through their American agency, Amtorg Trading Corp., have recently placed an order for American Diesel generating sets numbering 34 separate units with a total of 7,600 hp.

The breakdown of this substantial piece of business is as follows:—

Worthington Pump & Machinery Corp. are supplying 22 engines rated 100 hp. at 500 r.p.m., equipped with Ideal Electric generators.

New London Ship & Engine Company are supplying six units rated 600 hp. at 300 r.p.m., equipped with generators supplied by Electric Machinery Mfg. Co. and exciters by the Electro Dynamic Company.

Orders for three engines of 600 hp. each were also let to both Fulton Iron Works and Cooper-Bessemer Corporation, the former operating at 300 r.p.m., the latter at 250 r.p.m. The Cooper-Bessemer units will carry Ideal generators and the Fulton units Electric Machinery Mfg. Co. generators with Electro Dynamic Co. exciters.

This order is outstanding not only due to its size but also to cash payment for immediate delivery. It is understood that the American Diesel sets will be used for standby service in conjunction with new hydro-electric power developments in Russia.

HERCULES MOTORS EXHIBITS

PLANS have been announced by John Keplinger, Vice-President and Sales Manager of Hercules Motors Corporation, for a complete exhibit of Hercules engines—both gasoline and Diesel—at the New York and Chicago automobile shows, the National Motor Truck Show in Newark and the A.T.A. Truck and Accessories Show, Louisville, November 15-18. Of special interest in all the exhibits will be the first showing of the DOO series, 3¾" x 4½", 4" x 4½" and 4¼" x 4½" four cylinder Diesels.

In the New York Auto Show the Hercules exhibit will occupy spaces C-2 through C-7; in the Newark Truck Show, space 31; in the Chicago Auto Show, space 36; and in the A.T.A. Show, spaces 41 through 45. Charles Balough, President, John Keplinger and W. W. Cromley will be in attendance at New York and Newark. Messrs. Balough and Keplinger will also attend the Chicago exhibit as will D. W. Latta and W. A. Lynch. Messrs. Latta, Lynch and C. R. Schuler will be in charge of the Louisville exhibit.

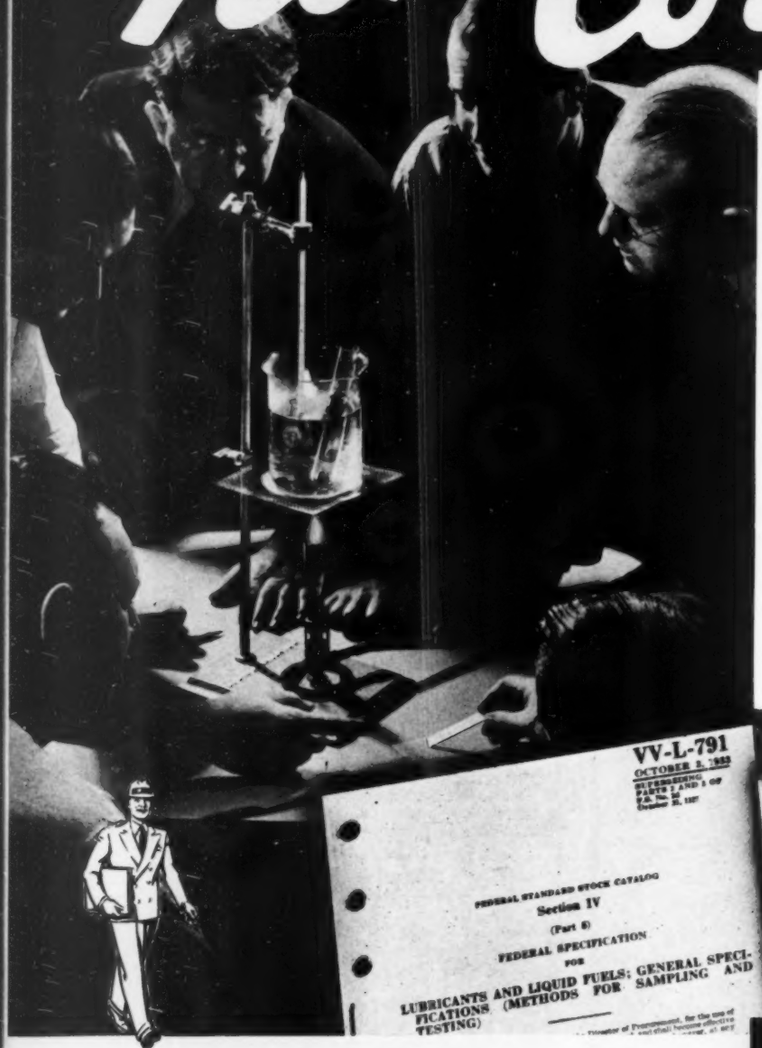
Special mounted displays have been arranged for each of the exhibits showing the various model Hercules engines used to power trucks and buses built by numerous leading American manufacturers.

DIESEL PROGRESS

INDEX OF ADVERTISERS

CAN YOU PROVE FOR YOURSELF THAT A MOTOR OIL IS

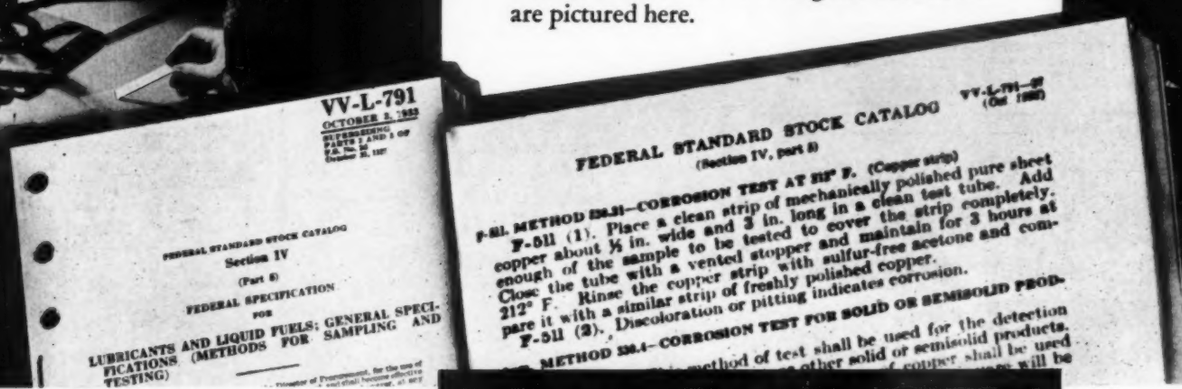
Non-Corrosive?



RING-FREE TEST NO. 6

gives you a quick, easy way to measure the corrosiveness of any motor oil. This "see-for-yourself-test" is one of a series of seven tests of motor oil quality featured by Macmillan.

The use of improved bearing metals and the higher operating temperatures of oil in all present-day types of internal combustion motors has made the question of corrosiveness important. The United States Government explains the best method of testing for corrosiveness in its publication "Federal Specifications for Lubricants and Liquid Fuels; General Specifications (Methods for Sampling and Testing)" No. VVL791, published October 3, 1933. The front cover of the booklet and top of page 97 showing the instructions for CORROSION TEST AT 212 degrees Fahrenheit are pictured here.



VV-L-791

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 6)

FEDERAL SPECIFICATION

FOR

LUBRICANTS AND LIQUID FUELS; GENERAL SPECIFICATIONS (METHODS FOR SAMPLING AND TESTING)

FEDERAL STANDARD STOCK CATALOG

(Section IV, part 6)

F-511. METHOD 320.31—CORROSION TEST AT 212° F. (Copper strip)

F-511 (1). Place a clean strip of mechanically polished pure sheet copper about ½ in. wide and 3 in. long in a clean test tube. Add enough of the sample to be tested to cover the strip completely. Close the tube with a vented stopper and maintain for 3 hours at 212° F. Rinse the copper strip with sulfur-free acetone and compare it with a similar strip of freshly polished copper.

F-511 (2). Discoloration or pitting indicates corrosion.

METHOD 320.4—CORROSION TEST FOR SOLID OR SEMISOLID PRODUCTS

method of test shall be used for the detection other solid or semisolid products. copper shall be used will be

Macmillan RING-FREE Motor Oil is non-corrosive . . . this government test will prove that is true. With this test you can prove for yourself the degree of corrosiveness of any lubricant. We do not ask you to believe any unsubstantiated claims of quality. In fact, your local Macmillan Man is anxious to run this test with you and to show you the other six RING-FREE tests which prove greater film strength, greater resistance to heat, longer cling, quicker penetration, carbon removal and improved performance because of reduced friction. In other words, he will help you prove to yourself that Macmillan RING-FREE Motor Oil is the best lubricant.

MACMILLAN PETROLEUM CORPORATION

530 West 6th St., Los Angeles, Calif.; 50 West 50th St., New York, N. Y., and El Dorado, Ark.

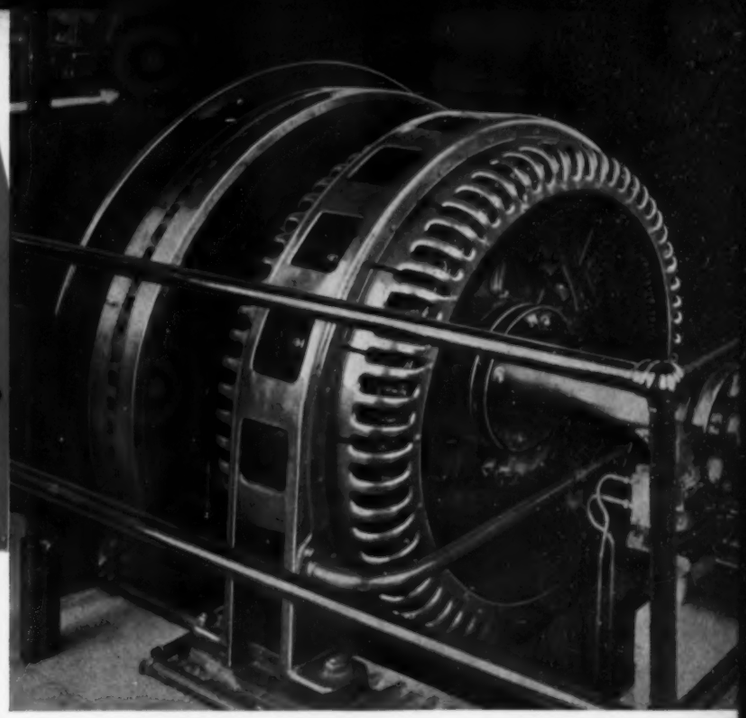
MACMILLAN

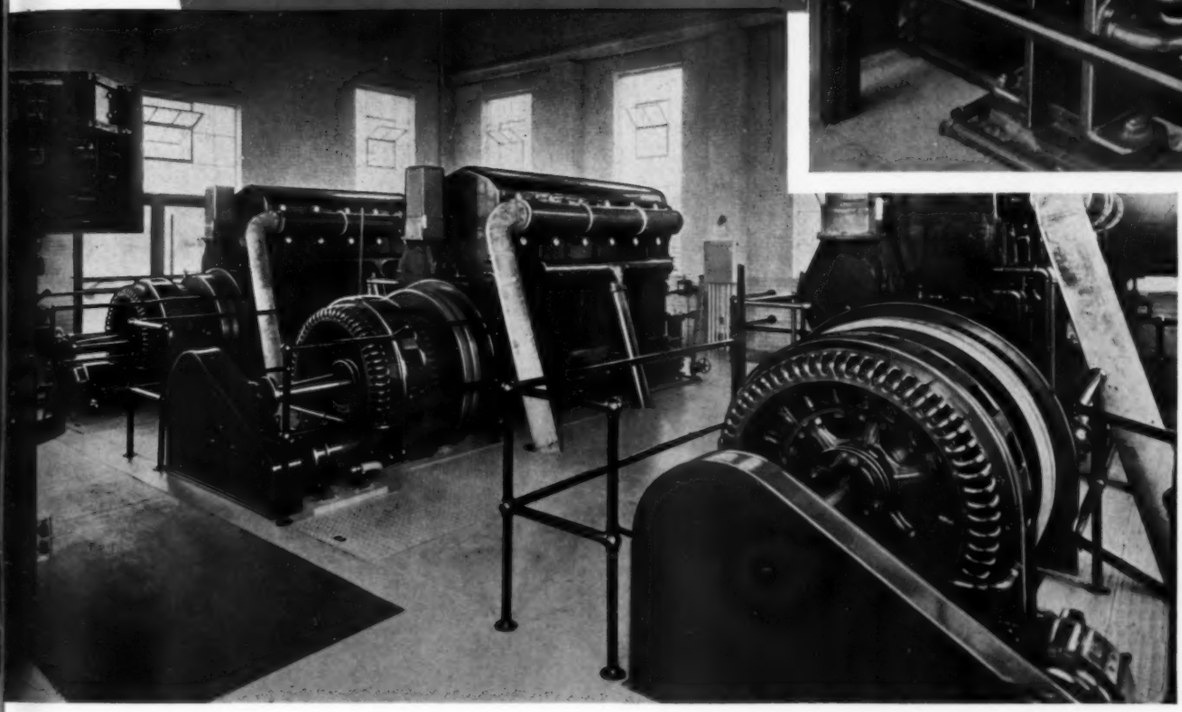
RING-FREE

MOTOR OIL

1. GREATER FILM STRENGTH
2. HIGHER HEAT RESISTANCE
3. LONGER CLING TO METAL
4. FASTER PENETRATION
5. REMOVES HARD CARBON
6. IS NOT CORROSIVE

Triplets— and all doing well!





CLOSE - UP
of one of the Elliott 250-kva. generators at Hominy, Oklahoma. Sturdy strength and weight show in every detail of construction.

Three Elliott 250-kva. 400 rpm. alternators driven by Nordberg Diesel engines, in the municipal plant at Hominy, Oklahoma. This is a new plant, operating since May 1st, and working right up to expectations.

PRETTY HUSKY TRIPLETS, TOO— these three Elliott generators. They need mighty little nursing or fussing over. They are no hot-house babies, but have tough constitutions.

In fact, there's never any question about the future of an Elliott generator. Its performance is always smooth, quiet, dependable. It just keeps on efficiently converting Diesel power into kilowatts for many years, with never a hitch.

Elliott "designed-to-the-job" generators, working with many kinds of Diesel engines, are doing well in scores of plants such as the one pictured above. They are built in all required sizes and types.

ELLIOTT GENERATORS *for Diesel engines*

ELLIOTT COMPANY

PITTSBURGH, PA.
Electric Power Dept., RIDGWAY, PA.
District Offices in Principal Cities

J-661

STREAMLINED

—and COOPER-BESSEMER POWERED!

Latest of Cooper-Bessemer Diesel-Electric locomotives . . . one of a pair recently completed for Ford Motor Company. Clean-cut and beautiful in their modern simplicity, these twentieth-century switchers set a new standard in streamline designing for this type of locomotive. Two modern Cooper-Bessemer Diesel engines power each of these 125-ton stalwarts, and assure their operators of a constant and ample source of smooth power. Built to meet every requirement of heavy-duty switching service, these streamliners will operate with convenience, reliability, and economy.

Above — One of the four Cooper-Bessemer Type GN-6 Diesel engines (500 H.P. at 675 r.p.m.) that power two new Diesel-electric locomotives owned by Ford Motor Company.

THE COOPER-BESSEMER CORPORATION

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Esperson Bldg., Houston, Texas
631 Spring Street, Shreveport, La.
640 East 61st Street, Los Angeles, Calif.
Magnolia Bldg., Dallas, Texas
Gas and Power Equipment Company, Birmingham, Alabama